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AIR CONDITIONING AND



REFRIGERATION EQUIPMENT

► PRODUCTION

► CONSUMPTION

► TRADE

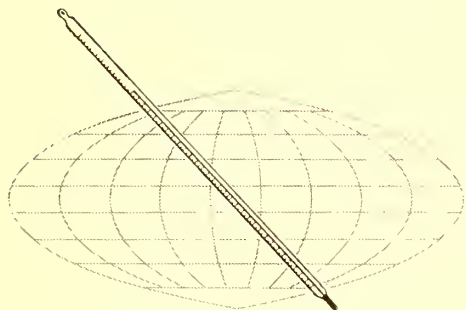
Selected Foreign Countries

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U.S. DEPARTMENT OF COMMERCE

BUSINESS AND DEFENSE SERVICES ADMINISTRATION

AIR CONDITIONING AND REFRIGERATION EQUIPMENT



PRODUCTION
CONSUMPTION
TRADE

Selected Foreign Countries

UNITED STATES DEPARTMENT OF COMMERCE
Frederick H. Mueller, Secretary

BUSINESS AND DEFENSE SERVICES ADMINISTRATION
William A. White, Sr., Administrator

General Industrial Equipment and Components Division
Charles F. Hughitt, Director

1960



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Foreword

This survey of air conditioning and industrial-commercial refrigeration equipment discusses the production, consumption, and trade of selected foreign countries. Emphasis is given to competitive factors, market potential, trade opportunities, and other factors of interest to U.S. industry.

Special appreciation is extended to the following members of the U.S. Foreign Service and others at Foreign Service posts abroad who supplied the basic data:

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United Kingdom	R. H. Thompson
Venezuela	R. E. Olson
West Germany	R. C. Huffman

Lists of principal manufacturers, importers, and dealers of air conditioning and refrigeration equipment in many of the countries discussed herein can be obtained at \$2 each from the Commercial Intelligence Division, Bureau of Foreign Commerce, U.S. Department of Commerce, Washington 25, D.C., or through the nearest Field Office of the Department.

Value figures have been converted from national currencies to U.S. dollar equivalents at applicable exchange rates.


Only selected countries are treated in this survey. Further details on any of these countries or basic data on other countries may be obtained from the Division.

JUNE 1960

WILLIAM A. WHITE, Sr., *Administrator,*
BUSINESS AND DEFENSE
SERVICES ADMINISTRATION

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Australia

Production

Production of air conditioning and refrigeration equipment in Australia was as follows, in fiscal year 1956, according to the Government:

<i>Product</i>	<i>Units produced</i>	<i>Approximate value</i>
Room air-conditioners.....	2,252	\$538,000
All other air-conditioning equipment.....	Not available	4,997,000
Refrigeration equipment.....	1,500	7,616,000
Commercial refrigerators (over 12 cubic feet).....	4,100	2,289,000
		<hr/>
		\$15,440,000

Detailed figures are not yet available for later years, except for room air-conditioners (in units):

1956.....	2,252
1957.....	3,480
1958.....	4,434
First quarter 1959.....	1,307

Production of air conditioners has increased substantially in recent years, and single installations worth several hundred thousand dollars each, which a few years ago were rare, are now commonplace. For example, one large company increased its annual turnover from \$450,000 to \$4,500,000 during the last 9 years. The new M.L.C. Building in North Sydney has the largest air conditioning system in the country, installed at a cost of \$1½ million.

Room air conditioners and commercial refrigerators are manufactured by electrical appliance firms, which also make washing machines, radios, television sets, electric irons, and similar items. Electrical appliance manufacturers usually have excess capacity, and some refrigerator plants are using less than half of their effective capacity. A number of these plants are now turning to the manufacture of package room air conditioners as an additional line.

Raw materials are in adequate supply. Labor is mainly of the unskilled or semiskilled type, and is freely available. The industry currently employs 3,000-4,000 persons. It is mainly Australian-owned, although a number of firms produce under license from American and other overseas companies.

Channels of Distribution

Refrigeration and air conditioning units are distributed by wholesale houses and normal retail outlets in all cities. More complex custom-built installations are usually sold, installed, and serviced by the manufacturer.

Consumption

Present demand for commercial air conditioning is satisfied by local firms. The growing demand for custom-built air conditioning may soon exceed the existing capacity of these producers, now operating at full capacity. Package air conditioning units are not yet firmly established on the market, and supply has thus far kept pace with demand.

Demand for air conditioning in commercial office buildings is increasing. At the present time, considerable building activity is occurring in the larger cities, particularly Sydney and Melbourne, and those firms specializing in commercial and industrial air conditioning are experiencing an upward trend. New and bigger buildings are planned for the future.

Package air conditioning units were first marketed some years ago, but the 1-ton units then being made were too small for local conditions. When the extravagant claims made for them were not realized, the market collapsed. New units now being marketed are bigger, about 1¼ tons capacity, and the initial response to local advertisements has been excellent. Large air conditioning units capable of cooling an entire house are almost unheard of, and the potential of this market is considerable.

Foreign Trade

In comparison to domestic trade, imports and exports are so small as to have little effect on the overall supply position. The major import items are components and control system parts for commercial refrigeration and air conditioning units. Imports of refrigeration parts are currently about \$2 million per year, the United States share being 25-40 percent.

Refrigerating appliances of the types used for food

Australia

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Refrigerating appliances of the types used for food

storage (up to and including 16 cubic feet gross internal capacity), and associated driving units and apparatus are subject to the following ad valorem import duties: British preferential (B. P.) 20 percent; most favored nation 37½ percent; and General (G) 37½ percent. All other refrigerating appliances and parts are assessed 30 percent, 47½ percent, and 47½ percent, respectively. British Preferential (BP) rates apply to imports from the United Kingdom, Canada, and other British Commonwealth countries. Most Favored Nation (MFN) duties are applicable to the United States and most non-Commonwealth countries. The General Tariff (G) applies to only a few countries.

Licenses are required and they are obtained by importers in advance of shipment. Imports from nondollar sources are given "B" licensing treatment. Import licenses are issued for refrigeration equipment against quotas established for the importer. Goods from dollar sources—United States, Canada, and other countries—are subject to administrative control. Each application for license is dealt with individually on its merit. Licenses are usually issued if similar goods are not available from domestic or nondollar sources on commercial terms.

Exports usually require export licenses, which are readily granted in most cases.

Market Potential and Investment Opportunities

Sources within the industry compare the present domestic market for air conditioning to that existing 10 years ago in the United States. Because of Australia's present import restrictions, United States export opportunities are for the most part limited to items unobtainable, at better terms, from other sources of supply. An opportunity exists for dollar investment in firms manufacturing commercial air conditioning units, especially control equipment for these units.

However, potential investors should consider the following points: Local equipment is as good as any available, and any new equipment marketed will need to be equally good; the climate is hotter than that of the United States, except in certain specific areas; and industry executives feel that opportunist manufacturers will tend to give the air conditioning industry excess capacity, as they have in the past with refrigerators and washing machines, and as a result only soundly established firms marketing first quality products will survive.

Australia: Foreign Trade in Air-conditioning and Refrigerating Equipment, 1956, 1957, and January-June 1958

[Quantity in units; value in \$1,000]

Commodity and country of destination or origin	Exports						Imports					
	1956		1957		January-June 1958		1956		1957		January-June 1958	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
No. 5511—Mechanical refrigerating appliances and parts thereof, household:												
United Kingdom.....	114	59	5	18	3	11	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
United States.....							N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Other countries.....	774	199	963	551	564	330	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Total.....	888	258	968	569	567	341	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Total reexports.....	18	44	15	28	2	15						
No. 5515—Mechanical refrigerating appliances and parts thereof (other than household):												
United Kingdom.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	90	64	76	45	4	11
United States.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	29	62	58	112	40	65
Other countries.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	5	6	6	6	2	3
Total.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	124	132	140	163	46	79
No. 5519—Parts of mechanical refrigerators:												
United Kingdom.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.		1,190		1,168		615
United States.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.		541		599		223
Other countries.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.		136		150		93
Total.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.		1,867		1,917		931
No. 5520—Other than mechanical refrigerators and parts thereof:												
Total.....	667	178	541	158	220	70	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Total reexports.....	33	4	9	1	1	negligible						

Australia: Foreign Trade in Air-conditioning and Refrigerating Equipment, 1956, 1957, and January-June 1958—Continued

[Quantity in units; value in \$1,000]

Commodity and country of destination or origin	Exports						Imports					
	1956		1957		January-June 1958		1956		1957		January-June 1958	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
No. 5525—Nonmechanical refrigeration appliances, not elsewhere identified:												
United Kingdom.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	-----	-----	-----	-----	3	5
United States.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1	neg.	-----	-----	-----	-----
Other countries.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	65	5	-----	-----	44	3
Total.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	66	5	-----	-----	47	8
No. 5529—Parts:												
United Kingdom.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	-----	36	-----	23	-----	7
United States.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	-----	32	-----	31	-----	18
Other countries.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	-----	13	-----	11	-----	7
Total.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	-----	81	-----	65	-----	32
No. 5999—Machinery, not elsewhere identified:												
United Kingdom.....		93		221		177	-----	7,056	-----	8,006	-----	3,995
United States.....		42		50		22	-----	4,089	-----	3,635	-----	1,531
Other countries.....		2,379		2,592		1,321	-----	2,065	-----	2,690	-----	2,489
Total.....		2,514		2,863		1,520	-----	13,210	-----	14,331	-----	8,015
Total reexports.....		293		219		109	-----	-----	-----	-----	-----	-----
No. 9710—Plant and special equipment for large scale projects:												
United Kingdom.....				7			N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
United States.....							N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Other countries.....		748		867		360	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Total.....		748		874		360	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
Total reexports.....		179		189		20	-----	-----	-----	-----	-----	-----
No. 9719—Other large-scale project machinery, not elsewhere identified:												
United Kingdom.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	-----	1,811	-----	3,396	-----	2,085
United States.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	-----	1,132	-----	2,661	-----	2,076
Other countries.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	-----	1,103	-----	813	-----	263
Total.....	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	-----	4,046	-----	6,870	-----	4,424

N.A.—Not available.
Source: Australia—Export and Import Statistics.

Belgian Congo and Ruanda-Urundi

Channels of Distribution

Almost all air conditioning and the greater proportion of refrigeration equipment is sold in the six provincial capitals. About 50 percent of all sales are made to consumers in the Leopoldville area. Most sales are made through agencies distributing one make exclusively. United States equipment is imported directly from the manufacturer, and is installed and serviced by the local sales agency. Only one agency in Leopoldville is known to sell package air conditioning without installing it.

The biggest agencies are usually held by well-established retail firms, such as CHANIC and SEDEC, which are affiliated with the state-affiliated companies controlling much of the country's economy, but a few large independent agencies also distribute air conditioning products. Small independent retail outlets sell only a small percent of the air conditioning and refrigeration equipment, usually small European refrigerators and package air conditioners.

Consumption

No air conditioning or refrigeration equipment is produced in or exported from the Belgian Congo or Ruanda-Urundi, nor are specific statistics available on consumption. However, because such products are not produced locally, and re-exportation and stocking practices do not appear to be appreciable, the volume of imports is a reasonably reliable index of consumption. Government import statistics show no trans-shipment or re-exportation of equipment. Stocks are reportedly held to a minimum consistent with sales volume and the time required to receive orders.

Cost and service facilities are considered to be the most important factors in sales. Small independent retail outlets have attempted sales, particularly of package air conditioning, without service facilities. The results have been poor. The technical ability required to provide service is both rare and expensive.

Another reason for the small volume of sales is

expensive electricity. More important for United States exporters is the 220-volt, 50-cycle system in use. American equipment is normally not made for this current, and American products lose up to 15 percent of their original capacity when they are adapted to it.

Unitary Air Conditioners.—Sales of room air conditioners are divided fairly evenly between private individuals and businesses. Sales to businesses are almost entirely for offices. Commercial consumption of package air conditioners should continue at a significant level as long as business hesitates to invest in central systems. House-size package units are not sold.

Sales of package air conditioners have risen phenomenally in the last three years, and are expected to continue for the next few years. Original resistance to air conditioning as something new has been broken down. Introduction of air conditioning in offices has contributed greatly to its use in the home. However, the market is quite competitive, and the dominance of United States products is beginning to be challenged by European equipment.

Central Plant Air Conditioning Equipment.—Business offices presently consume most of the central air conditioning. Industrial users, hotels, and theaters represent the remaining market. Original price and the cost of installation and power make these units too expensive for the private consumer.

Consumption is increasing, but the demand is much less marked than for package units. Even large enterprises seem to be hesitant about purchasing because of the present unsettled economic and political conditions. Installation and upkeep of central systems requires technicians, who are rare and expensive. For this reason, a few agencies now specialize in the sale of central air conditioning systems. Foreign competition, particularly from Denmark, is starting to lessen the dominant position of United States products.

Refrigeration Equipment.—The market for industrial and commercial refrigeration equipment is limited. The enterprises that might use this equipment are fewer than the size of the country would

indicate and have not increased markedly over the last few years. Little increase in consumption is expected. No great demand exists for frozen food products, and thus processing is yet to be developed. Transportation is expensive, and so much handling is required that necessary minimum temperatures often cannot be maintained beyond a few population centers. Any substantial increase in sales will depend upon a general expansion of the economy.

Commercial Refrigerators.—The sale of commercial refrigerators is restricted almost entirely to the provincial capitals and Leopoldville. Retail outlets, food processors, and hotels are the principal consumers. Only a moderate increase in the sale of walk-in refrigerators is expected because food processing and distributing enterprises are growing slowly. The market for display cases is saturated; one sales agency reports sales of two or three units a year; another agency has sold none in 6 months. Self-service cases may find a small market as the European shopper gradually shifts from the traditional day-to-day marketing to weekly buying. Only one American-type supermarket is in operation, and food outlets are slow in adopting American display and service practices.

Imports Duties

Freezers and commercial refrigerators and refrigeration components are subject to a 6 percent ad valorem import duty; spare parts for freezers and commercial refrigerators, 5 percent.

Market Potential

Although the total population is more than 13.7 million, the market for air conditioning and refrigeration equipment is confined almost entirely to the European population of 107,000. This population group is almost static. In terms of families, it constitutes a market of about 20,000, many of whom are living on a very moderate scale compared to United States standards. Package air conditioning sales to this limited purchasing group should reach a saturation point in the next few years.

African manual workers are usually paid between \$25–\$100 a month, and African clerks receive between \$60–\$160 a month. Fringe benefits are included in these estimates. The cost of European labor is much greater. It ranges from \$6,000–\$10,000 for those hired locally, and from \$10,000–\$15,000 for those hired abroad.

The African population is a large future potential

market, but immediate prospects are not encouraging. Perhaps five air conditioners were sold in 1957 among the 350,000–400,000 Africans in Leopoldville. The income and savings of the great mass of Africans do not allow for the purchase of air conditioning and refrigeration equipment. An even more fundamental factor limiting sales is the native pattern of life, in which air conditioning and refrigeration equipment does not play a role. However, one agency that has set up a financing plan looks forward to a slow increase in sales.

The climate is not as universally hot as might be supposed. The best market for air conditioning is in the western and northern regions; relatively little need is felt in the east and in Elisabethville.

The country is in an economic slump, and political events are creating uncertainty in African-European relations. Consumer sales are continuing, but the business community is holding back on its investments. The market for air conditioning and refrigeration equipment is neither wide open, nor an easy one in which to sell.

The predominance of a few big Belgian enterprises in the Congo's economy affects sales of other countries. Much construction is planned in Belgium, and decisions on air conditioning and refrigeration equipment are often made there. When purchases are made in the Congo, the agency associated with the Belgian enterprise usually receives all its business.

Local sources suggest that more advertising assistance be given by manufacturers, and more important, that this advertising *all be in French*.

Belgian Congo and Ruanda-Urundi: Industrial and Commercial Establishments Representing Potential Markets for Refrigeration and Air Conditioning Products

Type	1954	1955	1956	1957	Increase or decrease, 1954 to 1957
Dairy products.....	214	219	203	205	-9
Breweries.....	8	8	8	10	+2
Soft drink bottling.....	42	41	41	42	0
Ice makers.....	34	34	35	32	-2
Cold storage.....	28	42	76	82	+54
Fresh fish.....		47	49		
Hotels, restaurants.....	471	467	595	603	+132
Industrial chemicals.....	15	10	15	14	-1
Distillation products.....	22	25	20	20	-2
Mineral oils.....	6	5	5	5	-1
Theaters.....	127	172	192	206	+79
Textiles.....	8	8	8	8	0
Pharmaceutical products.....	8	5	5	5	-3
Bakeries.....	220	255	345	363	+143
Manufacturers of boats and barges.....	52	54	52	49	-3
Manufacturers of railroad equipment.....	9	9	9	9	0
Totals.....	1,264	1,401	1,658	1,653	+389

Source: Congo Belge-Statistiques aux Annees, 1954-57.

Another suggestion is that equipment be produced which is designed to run on 220-volt 50-cycle electric current. American-designed products for this current could be made in Europe and shipped to the

Congo. More frequent visits by company representatives, particularly technicians, is recommended to indoctrinate sales agencies and assist them in sales and servicing.

Belgian Congo: Imports of Air-conditioning and Refrigerating Equipment, Excluding Domestic Refrigeration, 1954-58

[Quantity in units except as otherwise indicated; value in thousand dollars]

Commodity and principal country of origin	1954		1955		1956		1957		1958	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
No. 84.15.41—Freezers and commercial refrigerators of not more than ½ horsepower:										
United States.....	100	72	187	92	108	88	117	96	222	167
United Kingdom.....		4		4		6		6		
Belgium.....		26		30		18		26		12
France.....		4								
West Germany.....				30		10		8		
Denmark.....										2
Total ¹		110		160		140		150		193
No. 84.15.42—Freezers and commercial refrigerators of less than ½ horsepower:										
United States.....	333	106	526	140	2,672	150	651	202	487	139
United Kingdom.....		4		12		12		14		6
Belgium.....		6		2		2		12		8
Union of South Africa.....		10		2						4
West Germany.....						42				
Sweden.....								8		
Total ¹		130		174		256		250		165
No. 84.15.90—Spare parts for freezers and commercial refrigerators: ²										
United States.....	10,367	36	8,850	28	10,433	32	4,178	22	16,097	38
United Kingdom.....		10		12		6		6		14
Belgium.....		44		8		10		10		14
Union of South Africa.....		4								3
Switzerland.....				16		52		52		17
Total ¹		94		68		112		126		112
No. 84.15.51—Refrigerator components less than 3 horsepower:										
United States.....	378	44	303	46	671	60	438	70	273	45
United Kingdom.....		4		4		4		4		16
Belgium.....		2		24		24		60		14
West Germany.....		6								
Union of South Africa.....				4		12				
Switzerland.....								38		
Denmark.....										35
Total ¹		70		82		94		192		122
No. 84.15.52—Refrigerator components more than 3 horsepower:										
United States.....	24	36	26	20	31	22	15	16	95	43
United Kingdom.....		4		6				194		17
Belgium.....		74		120		70		116		87
Denmark.....		26				30				16
Kenya.....				66						
Switzerland.....								60		75
Total ¹		170		234		144		437		241
No. 84.12.20—Air-conditioning units (package and components): ²										
United States.....	118,493	382	158,376	520	295,013	694	288,312	768	417,882	1,088
United Kingdom.....		6		2				4		
Belgium.....		82		4		6		2		12
France.....		4								
Switzerland.....				2						2
West Germany.....								10		1
Union of South Africa.....										6
Total ¹		472		566		702		814		1,113
No. 84.10.90—Spare parts for air-conditioners: ²										
United States.....	10,121	26	25,178	46	11,815	32	4,508	14	17,216	53
United Kingdom.....				4		4		4		5
Belgium.....		4		24				4		2
Netherlands.....								4		
Total ¹		32		76		38		24		60

¹ Includes countries other than those listed.

² Quantities in kilograms.

Source: *Bulletin Mensuel des Statistiques au Congo et Ruanda-Urundi*.

Belgium-Luxembourg

Production

The Grand Duchy of Luxembourg, whose population is only 315,000, does not manufacture or export any air conditioning and refrigeration equipment. Only one manufacturer of air conditioning equipment operates in Belgium, also producing commercial and household refrigerators and hot-air systems. The firm manufactures about 1,000 package air conditioning units annually, of which 50 percent are the window-type. Most of the window-type units are exported, principally to the Congo. From 15-20 air conditioning systems are manufactured annually on order for theaters and industrial concerns.

The same manufacturer produces annually 5,000-6,000 ice cream cabinets, 4,000 bottle coolers, and 3,000 beer coolers, the latter for sale to cafes. It also turns out 3,000 standard display cases for food retailers, and builds to order about 200 additional display cases and 50 walk-in units.

Producing areas are Antwerp, Wavre (near Brussels), and Turnhout. Producers of mechanical (as opposed to absorption) refrigeration equipment import piston compressors and controls manufactured by a United States concern having licensing agreements in Denmark and Italy. Mechanical parts are not produced. Therefore, manufacturing processes are largely limited to cabinets, interiors, tubing, and assembly. Semifinished materials are freely available. Industrial labor earns an average of 26 francs (U.S. \$0.52) per hour. Skilled labor is in adequate supply.

Consumption

No statistics on air conditioner consumption in Belgium are available, but it is probably negligible. The climate is chilly and damp. Even in mid-summer, temperatures seldom get into the 80's. Heat waves are rare and of short duration. One dealer reports that even the small number of units purchased are shipped to the Congo.

Likewise, air conditioning systems in retail stores, movie theaters, and factories are rare. However,

installations have increased rapidly over the past 2 or 3 years. One importer installed 11 large (3-15 hp) units in 1958.

Commercial refrigeration equipment, such as display cabinets, ice cream cabinets, and beer coolers, is purchased by food retailers, cafe operators, slaughter houses, and ice cream manufacturers. Ice cream is especially popular, as is beer. Commercial refrigerators in use totaled 120,000 in 1958.

Air conditioning equipment is not used in Luxembourg in homes or public buildings because the climate does not require it. A large air conditioning system has been installed in the only cigarette manufacturing plant; and a few laboratories, research, testing, and medical facilities are equipped with units. Service facilities are readily available for commercial refrigeration equipment.

No information is available on commercial and industrial refrigeration equipment sales in Luxembourg, but more food stores tend to use such equipment, especially the supermarkets in the larger cities.

Imports

Import figures for Luxembourg are not available, but units reportedly come from the United States, England, Germany, France, and Sweden. Air conditioning is assessed a 6 percent ad valorem import duty in Belgium-Luxembourg, as are also all refrigeration equipment and parts, except for complete refrigerators having an external volume not exceeding 2 cubic meters. Duty for the latter category is 12 percent. Sales tax is 5 percent of duty-paid value for air conditioning equipment, 15 percent for complete refrigerators having an external volume not exceeding 2 cubic meters, and 10 percent for all other refrigeration equipment.

No import or export license is required. Effective January 1, 1959, the above duties were reduced by 10 percent for imports from the other European Economic Community countries (France, West Germany, and Italy).

Market Potential and Investment Opportunities

The possibility of the United States expanding its export position in Belgium-Luxembourg should be considered in terms of the Common Market. The two countries will naturally depend on the Common Market partners, such as Germany and France, for equipment. Therefore, unless the United States makes sales through Common Market subsidiaries or licensees, lower labor costs in the Common Market area, coupled with the possible free exchange of goods, could adversely affect United States exports.

Medium-sized manufacturers in the two countries want to attract foreign capital to strengthen existing enterprises and establish new lines of production. However, the presence of a limited domestic market and competition from established West European manufacturers would make an exacting market survey necessary to determine whether the location would be desirable within the Common Market area.

United States sales through subsidiaries in third countries should contribute to sales in Belgium-Luxembourg. Such sales are entirely feasible and are already significant in the market. Private

United States investors will encounter no special impediments in the refrigeration industry. Local capital participation is not required but can be arranged.

Belgium-Luxembourg: Value of Foreign Trade in Refrigerating Equipment, 1950, 1956, and 1957

[Dollars]

Commodity and country	1950	1956	1957
Imports			
Refrigerators of volume not exceeding 2 cubic meters:			
West Germany		2,322,920	3,949,540
United States	2,807,500	1,395,580	1,434,860
United Kingdom	403,760	690,940	670,940
Total ¹	3,616,100	4,881,480	6,947,800
Miscellaneous refrigerating equipment:			
West Germany		727,620	427,300
United States	844,480	329,960	460,340
United Kingdom	90,220	192,120	309,800
Netherlands		91,640	72,720
Total ¹	1,073,580	1,422,800	1,463,260
Exports			
Refrigerators of volume not exceeding 2 cubic meters, total	162,000	535,920	640,120
Miscellaneous refrigerating equipment, total	182,120	396,900	483,600

¹ Includes countries other than those listed.
Source: National Statistical Institute, Brussels.

Belgium-Luxembourg: Foreign Trade in Air-conditioning and Refrigerating Equipment, # 839b, 1955-58

[Quantity in metric tons; value in \$1,000]

Country of origin or destination	1955		1956		1957		1958	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Imports, total ¹	646	1,084	784	1,311	766	1,359	700	1,327
United States	75	180	153	315	229	440	132	287
Other countries	571	904	631	996	537	919	568	1,040
Exports, total ²	266	482	220	360	273	372	173	376
Belgian Congo	119	226	61	98	168	179	49	129
Other countries	147	256	159	262	105	193	124	247

¹ None from the Belgian Congo.

² None to the United States.

Source: *Bulletin Mensuel du commerce Extérieur de L'union Economique Belgo-Luxembourgeoise*, Royaume de Belgique Ministère des Affaires Economiques, Institute National de Statistique, Brussels.

Brazil

The Brazilian air conditioning and refrigeration equipment industry has developed considerably in the last four years, mainly because the Government has tightened its exchange regulations on importation. Foreign investors have found it good business to begin the local manufacture and assembly of air conditioners and refrigerators. To some extent, local capital has been invested. With a few exceptions, all air conditioning and refrigeration equipment is manufactured either by local subsidiaries of United States firms or by local companies licensed by United States firms.

Production

Most component parts of air conditioning and refrigeration equipment are manufactured domestically. Parts which are imported include compressor units, thermostats, and some copper tubing. For use in manufacture and assembly, the industry imported in 1957 some \$4.5 million worth of compressors, parts, and accessories. At present, the industry is somewhat short of steel plate for equipment bodies. However, this shortage is felt by industry as a whole and the Government is improving the situation by importing steel plates to supplement the production of *Companhia Siderurgica Nacional*.

The plastics industry supplies dials, interior linings, shelves, drawers, knobs, and similar components. Insulating materials are also locally produced. Electric motors are manufactured by the firms themselves or contracted for with local motor manufacturers.

Only one manufacturer of package air conditioners advertises that the complete compressor unit "with motor" is imported from the United States. Because exchange regulations and heavy import duties usually make the cost of imported motors prohibitive, most manufacturers prefer the local product.

The main producing area for commercial and industrial refrigeration equipment is the city and state of Sao Paulo, but Rio de Janeiro and Porto Alegre also do some manufacturing. In the field of commercial refrigeration, the location of the princi-

pal producing areas has strongly influenced consumption, mainly because only in those areas are proper installation and servicing facilities readily available. Commercial refrigerating units, such as ice cream cabinets, beverage refrigerators for restaurants and bars, and display cases, may be installed in other cities, either by manufacturers' representatives or by local firms. However, local firms cannot always guarantee proper installation and servicing.

Throughout the country are a number of refrigeration "technicians" who are usually only mechanics having limited knowledge of refrigeration equipment and who may be unable to install or service properly a commercial refrigerator. Local sources advise strongly against the employment of these "technicians" and state that in the long run the cheapest and speediest way to insure proper servicing and installation is to have it done either by the manufacturer or by firms he recommends.

Projects are under way which should insure a steady supply of electric power for the industry. The Sao Paulo industrial area, which at present is short of electricity, will receive additional power this year when operation of two new thermoelectric plants begin. New installations in Sao Paulo and Minas Gerais will also contribute considerably to a larger supply of electric power.

At present, labor is in adequate supply. Technical know-how is supplied by foreign technicians or by Brazilian nationals trained abroad. Local labor is easily trained and skilled labor is available. Foreign capital is involved to a large extent; about 80 percent of the total industry is controlled by subsidiaries of foreign firms or firms having foreign participation. The Government does not subsidize the industry, but stringent exchange and import regulations protect it.

Channels of Distribution

Every major city has an appliance store, which is either a representative or an agent for a manufacturer. One company, for instance, has named distributors in every major city. Distributors may cover a given area and also name subagents. The distributors and agents are usually authorized to

Brazil: Imports of Air-conditioning and Refrigerating Equipment, 1954-57 and January-June 1958

Commodity and country of origin	1954			1955			1956			1957			1958 (January-June)		
	Kilograms	Units	Fob value (dollars)	Kilograms	Units	Fob value (dollars)	Kilograms	Units	Fob value (dollars)	Kilograms	Units	Fob value (dollars)	Kilograms	Units	Fob value (dollars)
Commercial refrigerators:															
United States.....	1,885		2,687	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1,857	0	0	4,659
Sweden.....	719		882	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	0	0	0	0
Total.....	2,604		3,409	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	1,857	0	0	4,659
Parts and accessories for refrigerators:															
United States.....	1,212,499		2,422,862	9,296		47,017	4,589		28,827			46,390		4,726	24,731
Germany.....	277,438		706,521	1,263		10,339	2,137		17,441			38,450		86	552
Argentina.....	1,470		4,346												
Denmark.....	418,268		991,985	2,418		10,440	3,104		14,902			5,390		142	2,195
Finland.....	72,238		203,540												
France.....	9,659		27,439	2,028		20,056	365		3,764			3		339	
United Kingdom.....	7,772		33,764	3,121		22,495	3,004		30,264			2,680		23	543
Netherlands.....				87		97									
Italy.....	7,697		19,072												
Israel.....							1,954		11,400						
Yugoslavia.....	53,225		148,180												
Japan.....	324,585		944,801												
Sweden.....	3,758		7,088	111		1,518	69		914			56		96	687
Switzerland.....	109		3,423	371		11,417						475		338	4,325
Total.....	2,388,778		5,513,021	18,695		123,379	15,222		107,512			93,444		5,555	33,033
Refrigerators not elsewhere specified:															
United States.....	2,287		7,967	0		0	3,947		16,768			5,538		605	5
Denmark.....	0		0	0		0	420		1,099			0		0	0
Germany.....	0		0	230		1,100	0		0			1,300		0	0
Total.....	2,287		7,967	3,797		10,261	4,367		17,867			6,838		605	5
Air-conditioning equipment:															
United States.....	90,426		237,540	48,761		129,811	43,218		108,195			56,195		23,324	62,062
Denmark.....				2,865		12,197	103		493			27		10	106
Germany.....	155		488	70,255		120,722	79,763		338,443			550		968	
France.....				64,487		173,805	18,175		51,429						
Italy.....	11,060		27,970	4,200		12,240	5,700		7,276			2,362		2,658	
Israel.....												4,680		11,180	
Sweden.....												4,546		3,668	
United Kingdom.....												18,007		18,679	
Total.....	101,641		265,998	190,568		448,365	146,856		485,343			82,367		23,334	62,168
Refrigerating equipment and domestic and commercial refrigerators, basket category:															
United States.....	173,805		321,617	161,477		324,458	117,114		203,280			269,921		53,248	129,444
Germany.....	565,999		877,834	181,044		515,835	178,960		318,888			69,836		41,713	60,115
Spain.....												3,900			
Denmark.....	67,165		97,457	166,182		280,108	122,196		286,337			220,332		74,200	162,882
France.....				43,635		89,943	16,424		30,000			6,000		521	9,098
United Kingdom.....	205		771	38		131	38		3,414			34		765	6,270
Netherlands.....	24,113		29,100	20		92	16,683		20,901			6,785		1,785	
Italy.....	182,664		406,274	920		2,264						9,400		17,193	
Japan.....												54,380		4,900	11,385
Sweden.....	7,745		12,145	3,805		7,963	7,501		14,144			3,185		19,164	760
Switzerland.....	24,339		55,532	83,625		180,656	7,879		40,175			29,098		26	
Total.....	1,086,057		1,800,730	642,746		1,401,450	469,829		901,224			671,371		176,463	379,454

Source: American Embassy, Rio de Janeiro.

service the equipment. In large cities such as Rio de Janeiro, Sao Paulo, Belo Horizonte, Recife, and Porto Alegre, a single manufacturer may have more than one authorized distributor.

Consumption

The entire production of air conditioning and refrigeration equipment is consumed within the country. Package air conditioners vary in price from \$325-\$615, and commercial installations average around \$2,530 per 5 hp unit. Central systems may cost anywhere from \$87,000-\$217,000 or more, depending on their capacity. Commercial refrigerators and display cases, freezers, ice cream freezers, etc., are priced according to capacity. Commercial refrigerators range between \$455-\$1,475; display cases, \$880-\$1,212; freezers, \$527-\$780; and ice cream batch freezers sell for \$1,655.

Air Conditioning Equipment.—Package air conditioners are used in residences, offices, and small shops. Demand is now far above production and is expected to increase. Commercial and central air conditioning systems are installed on contract. Consumption trends are upward in all categories. In the Rio de Janeiro business area, several buildings already have central air conditioning systems and many buildings under construction will be so equipped. Many pharmaceutical plants, hotels, theatres, movies, banks, factories, and stores are already consumers of central plant systems.

Refrigerating Equipment.—Commercial refrigerators are used by enterprises such as supermarkets, butcher-shops, fish dealers, bars, restaurants, pastry shops, hospitals, and hotels. Refrigeration equipment is used in breweries, food processing plants, chemical plants, ice plants, and cold storage warehouses. Consumption of refrigeration equipment

may be expected to expand along with the present increase and improvement of electric production and distribution systems. Installation and servicing facilities should improve as the use of refrigeration becomes more common.

Foreign Trade

Imports of completely assembled refrigerating and air conditioning units were negligible in 1957. Equipment has not yet been exported because production is as yet insufficient to supply the domestic market. Import duties on air conditioning and refrigeration are as follows: 120 percent ad valorem; 5 percent surcharge; 1 percent port improvement assessment; and 5 percent of the marine freight charge (if shipped by sea).

Market Potential and Investment Opportunities

No restrictions are imposed on direct investments by foreign companies, or on local capital participation. Laws regulating foreign investments offer some advantages to investors desiring to transfer equipment for entire plants to Brazil. However, import tariffs must be paid on the equipment, unless otherwise exempted by a specific law. Joint participation with local capital has been successful in many industries.

The market for air conditioning and refrigeration equipment is growing. It expands with the growth of electric power supply, with a rise in personal income, and with population increases. As the electric power lines reach into more remote areas, consumption will naturally increase. Existing firms will doubtless expand their production capacities, but new investment still appears profitable.

Colombia

Demand continues strong for refrigeration units in Colombia. These are now being produced by several firms who import certain parts, such as compressors and condensers. Production of air conditioning units is limited. An expanding market is expected for refrigeration and air conditioning units. However, the future market for completed American-made units appears poor. Participation by United States firms in the local air conditioning-refrigeration industry could be increased through licensing arrangements with the local firms or through the sale of parts.

Production

Three large and several smaller plants manufacturing household and commercial refrigerators have been operating since the latter part of 1956. The largest plant in Bogota, *Industria Colombiana de Artfactos (ICASA)*, now produces commercial units on a large scale. By late 1959, the firm expected to double its plant size to 10,000 square feet, increase production, and begin production of air conditioners, stoves, automatic wringer washers, and perhaps other related items. The company also plans to install its own enameling facilities.

Several small producers of stoves, hot water heaters, etc., now send their enameling work to *Industrias Metalicas y Esmaltes de Colombia, Ltda.*, a Bogota plant specializing in enameling. A second appliance plant in Bogota, *Industria Centrales de Acero (INDUCERO)*, produces, on a large scale, such units as water heaters, gas stoves, kitchen cabinets, and sinks. The plant was recently expanded and modernized, and no plans for further expansion are reported. However, the firm is considering the assembly of American-designed air conditioners.

Other firms are *Industria de Refrigeracion (ACECOL) Ltda.* and *Nestor Mosceres (Friotechnico) Ltda.* of Barranquilla. Both firms produce commercial refrigeration units on a modest scale, and the latter company assembles some package air conditioners. Another firm is the *Industria de Refrigeracion Commercial (INDUFRIAL) Ltda.* of

Cartagena, which produces a small number of commercial refrigeration units.

Among the new firms expected to enter the appliance industry are: *General Electric International*, which is planning to begin building a large plant this year, probably in Bogota, equipped to produce an extensive line of refrigerators, air conditioners, washers, and perhaps other related appliances; *Cocinas y Neveras de Colombia (CONDESA) S.A.* of Bogota, which has been negotiating with various United States firms for licensing arrangements; and *The Centro Electro Mecanico San Diego (Industria Salman) Ltda.* of Bogota, which now produces stoves and water heaters on a small scale and expects to expand its operation and manufacture other appliances as yet unspecified.

Most new appliance manufacturing firms appear to prefer Bogota as the site for their plants. Industry spokesmen point out that the area is the best source for technicians and semiskilled labor (average monthly wage: \$50 for laborers, plus fringe benefits), has adequate power facilities, is the largest single local market, and perhaps most importantly, is the site of the Government, customs, and import offices, where top management personnel conduct daily business.

Air Conditioning Equipment.—Production has been limited to a few package units ($\frac{3}{4}$ and 1 ton), assembled by a firm in Barranquilla. Central plant units are not produced locally. Two firms expected to begin an assembly-type operation for package air conditioners, manufacturing a few parts, by the end of 1959.

Refrigeration Equipment.—Few refrigeration parts are produced locally, except those used by the plants in their own production. Rubber gasket-lining material and other rubber parts are made by domestic rubber plants, and many plastic parts are now being manufactured by independent factories. Metal shelves, ice trays, and similar items are being made by refrigerator-producing plants.

Commercial refrigeration units, such as bottle coolers, reach-in and walk-in boxes, and display cases have been produced locally by one large- and

one medium-size plant since 1956. Total output of all models (no data are available by unit types) is estimated at about 2,500 units in 1957 and 4,000 units in 1958. Although several types of common commercial refrigerators are manufactured locally, bottle coolers account for most of the production.

With the advent of severe Government import restrictions on all completed units and on many unassembled parts, several firms in 1958 began manufacturing units from basic materials of sheet steel, copper tubing, insulating material, thermostatic valves, and finished compressor units.

Channels of Distribution

Distribution is usually made from the factory directly to retail outlets, or to a few wholesale organizations, all of whom receive the same discount and are expected to sell at the same retail price.

Consumption

Consumption of refrigeration and air conditioning units has been limited largely to local production since 1955, when importation of all household appliances was sharply curtailed. The Government insisted that such appliances could and should be made locally, even though costs of locally produced units would be higher than for the imported equivalent.

Manufacturers and assemblers are selling all they can manufacture. Production is expected to meet demand in 1960, when local demand should be approximately 10,000 commercial refrigerators and units and 7,000 package air conditioners. According to a private industry study, estimated consumption in 1965 will be: Commercial refrigeration, 20,000 units; package air conditioners, 32,000 units. About 25,000 commercial refrigeration units and

11,000 package air conditioners are now in use in the country, according to estimates based on import figures.

Foreign Trade

Import duties on commercial refrigeration equipment were the same in 1958 as 1950, according to *Anuario de Comercio Exterior de 1954-1957* = 2 centavos per gross kilo plus 6 percent ad valorem. The same rate applied to air conditioners in 1950, but the percentage rate dropped to 3 percent in 1958. According to reliable sources, the Government is planning a new import list which may lift the restrictions on refrigeration and air conditioning units. It is even possible that future imports will be controlled through tariffs only.

No refrigeration or air conditioning units are exported. Prices of locally manufactured products are considerably higher than their imported counterparts. However, a Colombian-Ecuadoran trade commission met recently to discuss the possibility of increased trade between the two countries, and Ecuador reportedly included locally made refrigerators in the list of desirable trade commodities.

Market Potential and Licensing Opportunities

Future sales possibilities for refrigeration and air conditioning units appear poor. With a tariff, the higher price imposed on United States products keep them from competing with locally made units. However, a market for American products exists through the use of licensing, subsidiaries, and similar arrangements between American and Colombian firms and through direct sale of parts and equipment such as compressors and tubing.

Colombia: Imports of Air-conditioning and Refrigerating Equipment, 1954-57

[Quantity in gross metric tons; value in dollars]

Commodity and country of origin	1954		1955		1956		1957	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
No. 838-9—Air conditioners not elsewhere specified, domestic and commercial:								
United States.....	246	427,407	73	180,796	20	34,228	1	2,277
Other countries.....	12	15,696	8	2,814			11	30,351
Total.....	258	443,103	81	183,610	20	34,228	12	32,628
No. 839-5—Other refrigerating equipment:								
United States.....	450	702,943	314	472,765	1,034	1,762,155	333	753,634
Other countries.....	35	48,523	84	153,881	10	20,017	12	27,905
Total.....	485	751,466	398	626,646	1,044	1,782,172	345	781,539

Source: *Anuario de Comercio Exterior de 1954-1957*.

France

Production

Air Conditioning Equipment.—The manufacture of air conditioning equipment in France is comparatively new. Household units are made by two or three manufacturers, but a considerably larger number of manufacturers specialize in industrial and commercial units. However, most of these also produce heating equipment, fans, blowers, and the like.

In 1956, about 3,500 household air conditioners were sold; in 1957 production and sales rose to 9,800 units. Exports totaled 90 percent of production for both years, going principally to the French Overseas Territories. New types of more powerful household air conditioners adaptable for use in desert climates have been developed, and both production and demand are continually increasing.

Refrigerating Equipment.—Approximately 70 firms manufacture commercial, industrial, and household refrigeration equipment. Production of commercial refrigeration units totaled \$19.4 million in 1956; and \$21.4 million in 1957, when 55,000 units were produced. Industrial refrigeration production totaled \$9.1 million in 1956 and \$10.0 million in 1957. Since the beginning of 1959, the refrigeration equipment industry has slowed markedly.

Consumption

Air Conditioning Equipment.—The market for household air conditioners is small because of the moderate temperatures, and to some degree, the high cost. Production has increased as a result of an ever-growing demand in the Sahara region. The perfection of new techniques has stimulated the introduction of air conditioning equipment on ships, trains, offices, hospitals, and theatres. Although sales of industrial air conditioning equipment have increased, the field is still insufficiently exploited. Air conditioning equipment is usually sold by the manufacturer direct to the user. Prices range from \$400–\$500 per unit.

Refrigeration Equipment.—Sales of industrial refrigeration equipment, though they have increased

in the past few years, are still considered insufficient in agricultural areas. Only about 5 out of 100 farmers have their own refrigeration equipment, and only 10 out of 100 slaughterhouses are equipped with refrigeration systems. The refrigeration industry, as well as *Electricite de France*, is making special efforts to promote sales by sponsoring and financing extensive advertising campaigns.

Up to December 31, 1958, the Ministry of Agriculture granted a subsidy of 20 percent of the price of refrigeration equipment in addition to the 15 percent discount previously granted to purchasers of all types of agricultural material. However, in order to be eligible for the 20 percent subsidy, the refrigeration equipment purchased had to be manufactured in France, of the compression type, and specially designed for milk refrigeration. In addition, according to the Ministry of Agriculture, to obtain the 15 percent discount, the applicant had to satisfy the Government that he did not possess sufficient financial means of his own, and that the equipment was necessary for the improvement of his business. Such benefits were cut in 1959.

The use of food preservation equipment has increased greatly in the last 10 years. The transportation company *Societe de Transports et Entrepots Frigorifiques* transported in 1957 approximately 1 million metric tons of fresh food, fruits, vegetables, meats, fish, and dairy products. This company owns 2,900 refrigerated rail cars, 1,400 isothermal insulated rail cars, 250 refrigerated semitrailers, and 240 refrigerated tank cars. Considerable progress has been made recently in truck transportation of perishable products. All isothermal and refrigeration conveyances are systematically tested in experimental stations, and their quality is reported to be excellent.

The market for industrial refrigeration is seen in the 140 public or semi-public refrigerated warehouses having a total capacity of 670,000 cubic meters, and in the 520 ice-producing plants whose annual production of ice amounts to 1,300,000 metric tons. In 1939, the capacity of cold storage rooms had amounted to only 550,000 cubic meters. Refriger-

ators and refrigeration equipment are normally distributed through "concessionaires," who handle a single brand, and through about 15,000 retail outlets.

Costs of steel, the prime component of a refrigerator, and costs of energy (coal, water, electricity) compare with German figures. The "Turn Over Value" (TVA) tax is not a factor in competition with German refrigerators, because the TVA tax is added to the price when they are imported. However, a French-made refrigerator exported to the (Overseas Territories franc zone) is not assessed the TVA tax, thereby gaining an advantage.

Using the official rate of exchange, economists reported the average 1955 hourly wages for the iron and steel industry, including all charges, were 84 cents in France and 83 cents in Germany. Average wages, including all charges, in all manufacturing industries were computed for October 1956, using the free market rate of exchange to reflect actual purchasing power, at 72 cents for France and 73 cents for Germany. The total proportion of national income taken by the state in the form of taxes and charges of all kinds appears approximately equal in France and Germany. In France, a very high proportion of such taxes and charges are passed on to the consumer through the TVA and excises, and therefore are not a direct burden on the manufacturer. In the light of the above considerations, the French industry under the Common Market arrangement will apparently not be at any particular disadvantage, and its prices should be competitive.

Imports

The *Journal-Officiel* indicates that restrictions have not been lessened on imports of refrigerators and subassemblies from the Common Market countries, except for compression-type refrigerators, nor have imports of air conditioners been liberalized. Liberalization has not been extended to United States imports of air conditioners or refrigerators.

Air Conditioning Equipment.—Imports of air conditioning equipment were as follows in recent years:

	<i>Franc zone (Overseas Territories)</i>	<i>Other countries</i>
1956.....	\$5,508	\$501,046
1957.....	371	¹ 501,734
Jan.-July 1958.....	26	² 283,929

¹ Including \$189,656 from the United States.

² Including \$191,575 from the United States.

Self-contained air conditioners are imported principally from the United States, Belgium, Luxembourg, and Sweden. In addition, air hu-

midifiers and air filtering and purifying equipment are imported from the United States, Germany, and the United Kingdom. Imports of both refrigerators and air conditioning equipment consist mainly in processes and patterns for manufacturing under license. Some parts and subassemblies are imported, principally from the United States and Great Britain.

The minimum import duty rate applying to the United States for all air conditioning and refrigerating equipment, except for "furniture and installations incorporating a refrigerating unit," is 18 percent ad valorem. The excepted category is assessed a 15 percent duty. All air conditioning and refrigerating equipment is subject to a 25 percent sales tax based on c.i.f. duty-paid value except for nonprofessional installations of 300 liter and less capacity. These are subject to a 30 percent sales tax. In addition, a 3-percent customs stamp tax is imposed, based on total customs charges, e.g. 18 percent ad valorem × 3 percent. Import licenses are required.

Refrigerating Equipment.—Before World War II, most refrigeration equipment sold in France was imported. Owing to the shortage of foreign exchange, the Government exercises strict control over imports of refrigerating equipment. Imports of refrigeration equipment, subassemblies, and parts, probably including household refrigerators, are shown below:

	<i>Franc zone (Overseas Territories)</i>	<i>Other countries</i>
1956.....	\$23,276	\$1,909,656
1957.....	23,270	2,364,541
Jan.-July 1958.....	3,691	460,000

Included in the 1957 total was \$937,349 in value imported from the United States. France imports refrigeration equipment chiefly from the United States, Germany, and the United Kingdom.

Exports

Exports are limited principally to the overseas territories because of the high price of the equipment. Exports of refrigeration equipment, subassemblies, and parts (probably including household refrigerators) in recent years are shown in the following tabulation:

	<i>Franc zone (Overseas Territories)</i>	<i>Other countries</i>
1956.....	\$5,827,731	\$567,580
1957.....	8,800,164	¹ 490,803
Jan.-July 1958.....	9,356,073	² 723,003

¹ Including \$3,192 to the United States.

² Including \$1,174 to the United States.

Exports of self-contained air conditioners were as follows:

	<i>Franc zone (Overseas Territories)</i>	<i>Other countries</i>
1956.....	\$513,531	\$505,086
1957.....	1,090,233	467,631
Jan.-July 1958.....	1,190,169	290,465

France exports air conditioning equipment, chiefly to Algeria. Air humidifiers, dehumidifiers, and filters are exported to Belgium and Luxembourg.

Market Potential

It is not expected that activation of the Common Market will bring about important changes in the

French industry. Production and demand for air conditioning and refrigeration equipment is continually increasing. The limited use of refrigeration in agriculture, food preservation, and transportation indicates much room for expansion in its use.

The present limited exports of air conditioning equipment, because of noncompetitive prices, can be expected to be overcome by improved manufacturing methods and increased volume. The rising trend of living standards, the change from small to larger units, the introduction of supermarkets, and changes in marketing habits—all indicate a growing market.

France: Foreign Trade in Air-conditioning and Refrigerating Equipment, 1956-58

[Quantity in metric tons; value in thousand dollars]

Commodity and country	Imports						Exports					
	1956		1957		1958		1956		1957		1958	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
No. 84.12.00—Air-conditioning machines, self-contained, comprising a motor-driven fan and elements for changing the temperature and humidity of air:												
Franc zone.....	3	5	1	Neg	Neg	1	184	514	336	1,090	569	1,671
United States.....	35	161	34	190	-----	-----	-----	-----	-----	-----	-----	-----
Other countries.....	169	341	253	312	125	421	299	505	254	468	234	546
Total.....	207	507	288	502	125	422	483	1,019	590	1,558	803	2,217
No. 84.59.81—Aerothermic, aerorefrigerating, humidifying and drying units and similar appliances, self-contained, comprising a motor-driven fan and either a heat or cold exchanger or elements for changing the humidity of air: ¹												
Franc zone.....							38	82	109	242	14	27
United States.....	34	159	42	163	-----	-----	-----	-----	-----	-----	-----	-----
Other countries.....	60	234	55	184	175	303	356	665	161	369	5	13
Total.....	94	393	97	347	175	303	394	747	270	611	19	40
No. 84.59.82—Humidifiers and dehumidifiers: ²												
Franc zone.....											49	94
United States.....					31	191	-----	-----	-----	-----	-----	-----
Other countries.....					32	134	-----	-----	-----	-----	101	327
Total.....					63	325	-----	-----	-----	-----	150	421
No. 84.15.01—Refrigerators and refrigerating equipment, furniture and installations incorporating a refrigerating unit:												
Franc zone.....	Neg	1	1	3	2	4	2,225	4,993	3,368	7,694	5,656	11,876
United States.....	390	665	263	425	45	87	-----	-----	-----	-----	-----	-----
Other countries.....	388	534	476	715	395	649	56	112	152	303	792	1,186
Total.....	778	1,200	740	1,143	442	740	2,281	5,105	3,520	7,997	6,448	13,062
No. 84.15.11—Furniture and installations designed to be fitted with a refrigerating unit:												
Franc zone.....			Neg	Neg	-----	-----	35	56	72	107	84	135
United States.....					-----	-----	-----	-----	-----	-----	-----	-----
Other countries.....	203	226	305	327	274	336	20	39	3	6	30	43
Total.....	203	226	305	327	274	336	55	95	75	113	114	178

France: Foreign Trade in Air-conditioning and Refrigerating Equipment, 1956-58—Continued

[Quantity in metric tons; value in thousand dollars]

Commodity and country	Imports						Exports					
	1956		1957		1958		1956		1957		1958	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
No. 84.15.21—Refrigerating equipment with constituent elements, fixed on a common base or forming a group, compression type:												
Franc zone.....	6	22	6	18	2	5	110	286	106	258	235	562
United States.....	54	98	49	189	8	8	75	175	40	70	43	115
Other countries.....	139	265	96	184	68	113						
Total.....	199	385	151	391	70	126	185	461	146	328	278	677
No. 84.15.22—Absorption-type refrigerating equipment:												
Franc zone.....							33	78	43	86	64	135
United States.....	5	20	59	184	5	5	18	19	14	17	17	27
Other countries.....	25	26	91	120	16	51						
Total.....	30	46	150	304	21	51	51	97	57	103	81	162
No. 84.15.23—Other refrigerating equipment:												
Franc zone.....		Neg					62	91	93	192	65	117
United States.....							61	123	34	35	104	209
Other countries.....	16	29	28	67	17	49						
Total.....	16	29	28	67	17	49	123	214	127	227	169	326
No. 84.15.31—Parts and detached pieces:												
Franc zone.....			Neg	2	1	1	133	323	155	463	212	561
United States.....	22	36	5	115	24	127	62	100	16	60	8	28
Other countries.....	11	16	59	34	61	64						
Total.....	33	52	64	151	86	192	195	423	171	523	220	589

Neg—Negligible.

¹ Discontinued as of 1/15/58.

² Added as of 1/15/58.

 Sources: Republique Francaise, Direction Generale des Douanes et Droits Indirects, *Tableau Generale du Commerce Exterieur*, Paris; Ministere des Finances et des Affaires Economiques, Direction Generale des Douanes et Droits Indirects, *Statistique Mensuelle du Commerce Exterieur de la France*, Paris (1958).

French West Africa

The market for air conditioning and refrigeration equipment in French West Africa is fairly important and growing. The use of such equipment, which was minimal before World War II, has increased substantially in the last 10 years. One factor accounting for the increase has been the generally warm year-round climate. For example, in Dakar the annual mean temperature is 80.6° and the humidity 77 percent. A dry season lasts from mid-November through May, and a rainy season, called "hivernage," from June through October. The dry season is usually not unpleasant, but during the rainy season both the temperature and humidity are extremely high, and the atmosphere is sticky and enervating.

Another factor is that the standard of living of the European residents has improved. Most residents are Government officials and employees of large companies, often assigned to the country for several years. Thirdly, the large companies and the French and African Governments now recognize the need to offer more comfortable offices and dwellings to their employees, particularly their executives. Finally, industrialization has increased, mostly in plants where refrigeration is part of the manufacturing process.

Channels of Distribution

Equipment is imported by some large companies, whose operations involve wholesale and retail outlets. In addition, some importers sell to retailers and users.

Consumption

No air conditioning or refrigeration equipment is produced or exported. All requirements are imported. Therefore, consumption about equals imports. The principal items in use are room air conditioners, and an estimated dozen or more central-type units located in some of the larger stores in Dakar and elsewhere; refrigeration equipment for ice and cold-storage plants and for food processing and preservation; and commercial refrigerators.

The principal consumers of air conditioners are the Government; the large companies, for their offices and the dwellings of their employees; stores; and individuals. Commercial or industrial dehumidifiers are used by large companies in their warehouses and by some food-processing plants, such as flour mills. Consumers of refrigeration equipment are ice plants, cold-storage plants, food-processing plants, meat wholesalers, butcher shops, grocery stores and food departments of variety stores, hotels, ice-cream parlors, cafes, and pastry shops.

Imports of room air conditioners are not expected to increase much because construction of homes and apartment buildings has slowed down. However, refrigeration equipment demands should increase substantially because a backlog still remains to be filled. Accurate estimates are not available on the

French West Africa: Imports of Air Conditioning and Refrigerating Equipment, 1956

Commodity and country of origin	Units	Metric tons	Value (dollars)
No. 192410—Refrigeration appliances:			
United States.....	4,074	501	875
Other countries.....	4,348	516	753
Total.....	8,422	1,017	1,628
No. 192420—Other refrigeration appliances:			
United States.....	69	10	34
Other countries.....	48	7	17
Total.....	117	17	51
No. 192490—Parts and spare pieces of appliances:			
United States.....		7	23
Other countries.....		36	71
Total.....		43	94
No. 192500—Group listing, all aërothermal appliances:			
United States.....		195	487
Other countries.....		37	90
Total.....		232	577
No. 192600—Other thermal machines and appliances:			
United States.....		1	2
Other countries.....		1,718	2,685
Total.....		1,719	2,687

Source: *Statistiques du Commerce Exterior de L'A.O.F.*

French West Africa: Imports of Air Conditioning and Refrigerating Equipment, 1957

Commodity and country of origin	Units	Tons refrigerating capacity	Value (dollars)
Air-conditioning units:			
United States.....	N.A.	236.5	475,000
France.....	N.A.	33.2	93,686
West Germany.....	N.A.	N.A.	224
Commercial and industrial dehumidifiers:			
United States.....	69	20.0	40,524
France.....	16	4.1	8,386
Denmark.....	N.A.	N.A.	938
Commercial refrigerators, including household (reach-in, walk-ins, display case, etc.):			
United States.....	2,994	427.3	687,095
United Kingdom.....	1,318	174.5	215,876
Sweden.....	476	70.1	87,424
France.....	320	62.4	109,890
West Germany.....	105	9.0	15,214
Switzerland.....	80	8.5	12,652
Denmark.....	20	3.6	5,881
Miscellaneous refrigerating equipment, including household:			
United States.....	539	67.1	122,005
West Germany.....	138	32.2	49,938
France.....	116	14.0	25,100
Denmark.....	50	3.4	5,019
Switzerland.....	18	1.4	2,148
United Kingdom.....	15	1.5	1,890
Sweden.....	14	1.0	1,148
Refrigerating equipment, compressor capacity, 10 horsepower or more:			
United States.....	4	2.9	2,857
France.....	15	24.8	22,229
Refrigerating equipment spare parts:			
United States.....	N.A.	16.9	47,495
France.....	N.A.	15.8	29,852
West Germany.....	N.A.	N.A.	6,252
Denmark.....	N.A.	N.A.	6,186
United Kingdom.....	N.A.	N.A.	3,010
Switzerland.....	N.A.	N.A.	467
Sweden.....	N.A.	N.A.	419

N.A.—Not available.

Source: *Statistiques du Commerce Exterior de l'A.O.F.*

quantity of air conditioning and refrigeration equipment in use.

Service facilities are far from adequate because of the chronic shortage of qualified technicians and

spare parts, which frequently must be imported after a breakdown has occurred. Furthermore, the charges for such service are extremely high. Wholesale and retail prices are also abnormally high because of distance from sources of supply, customs duties and local taxes, slow turnover, and excessive profit margins.

Imports

Import prospects for United States equipment exist and should continue. One limiting factor is the variable availability of *Exportations Frais Accessoires* (incidental cost of exports) (EFAC) dollars, which can be used freely for imports in spite of the currency control regulations, and which are derived from the percentage of dollars exporters receive from sales to the dollar zone (usually 10 percent). Some items, such as air conditioners, are considered in the "luxury" class, for which severe import quotas are set. Import duties for air conditioning and refrigeration equipment are fiscal 10 percent plus customs 5 percent.

Market Potential and Investment Opportunities

The country lacks all the elements necessary to make an air conditioning and refrigeration industry successful, such as a high consumption rate, availability of raw materials, and a qualified labor force. Therefore, the desirability of direct United States investment in such an industry, with or without local participation, is remote.

India

The air conditioning and refrigeration industry in India was unorganized before World War II, and only after the conclusion of hostilities was production begun, stimulated by a gradual tightening of imports. Although the industry still depends on imports for some important basic raw materials and components, it has made considerable progress in the manufacture of less complicated parts, machinery, and components.

Production

Production of air conditioners and refrigerators consists mostly of manufacturing simple parts and assembling them into complete units using imported parts and components, such as compressors and controls. However, manufacture of small equipment, mostly for domestic use, has increased in recent years. Package-type room air conditioners, up to 2-ton capacity, and water coolers are now manufactured to a large extent, except for such essential parts as the hermetic compressors, controls, and cooling coils. These are imported.

Commercial refrigeration and air conditioning equipment of larger capacity is not produced on any organized basis, although attempts have been made during the last 2 years to erect such plants on the basis of local manufacture of some parts and accessories, and the importation of compressors, controls, condensing units, and chillers.

Production of room air conditioners and water coolers during the period 1954-58 was as follows (quantity in units and value in dollars):

Year	<i>Air Conditioners</i>		<i>Water Coolers</i>	
	Quantity	Value	Quantity	Value
1954-----	720	272,160	Not available	Not available
1955-----	876	331,128	760	319,200
1956-----	5,824	2,201,472	967	406,140
1957-----	6,983	2,639,574	1,390	583,800
1958----- (Jan.-Sept.)	8,896	3,362,688	1,630	684,600

Foreign manufacturers do not invest directly in the industry. However, Indian manufacturers have technical "know-how" arrangements with foreign firms, primarily American companies, for the local

manufacture of complete equipment and certain essential components.

The country is still dependent on imports of basic raw materials such as soft copper tubing, deep drawing quality sheets, and fiberglass insulation. However, manufacturers have successfully used mineral wool and foam plastic as substitute insulation material. The industry depends almost entirely on imports of hermetic compressors, condensing units, chillers, thermostat control equipment, and certain types of coils.

The Government recently granted an Indian firm a license to manufacture refrigeration coils in collaboration with an American firm. The Government has also approved proposals for the manufacture of small compressors for room air conditioners. Domestically manufactured components have increased in percentage of usage among the major manufacturers of air conditioners, between 65-88 percent; and in water coolers and refrigerators, between 60-75 percent.

Channels of Distribution

Manufacturers of air conditioning and refrigeration equipment have made two types of selling arrangements: the manufacturer appoints a sole selling agent, who in turn appoints distributors and dealers in various parts of the country; or the manufacturer appoints agents or distributors by district or sells direct to consumers. In both instances the manufacturer pays either a commission, or a trade discount, and an over-riding commission on the sale of the equipment, through the selling agents or distributors. These distribution arrangements are also followed by producers in foreign countries who sell their products in India. However, the amount of the commission paid by such producers may vary.

Consumption

No official estimates are available concerning present annual consumption. However, the Planning Commission estimates that by 1960-61 the

country would annually require the following quantities of equipment (in units):

Package-type room air conditioners.....	21,500
Central air conditioners.....	1,700
Ice making machinery.....	50
Cold storage plants.....	35
Commercial refrigerators.....	2,300

Import Duties

Air conditioning and refrigeration equipment is subject to a 10-percent ad valorem import duty. No import licenses are granted for complete unit or packaged-type air conditioners. However, import licenses are granted for parts of air conditioners. The quota for each established importer is $2\frac{1}{2}$ percent of the value of his base-period imports of complete units. The importer is able to select as his base-period any fiscal year between April 1, 1945 and March 31, 1956. Because the quotas are granted on a 6-month basis, only one-half the value of an importer's base-year imports is considered in the calculation of his quota. The import quota for other refrigeration and air conditioning machinery (except cabinet-type refrigerators) is 5 percent of the importer's base-period imports.

No import licenses are granted for complete cabinet-type refrigerators. However, import licenses are granted for parts of refrigerators. The quota for each established importer is $66\frac{2}{3}$ percent of the value of his base-period imports of complete refrigerators. Base-year and quota-calculation criteria are the same as for air conditioners.

Exports

The country exported 161 package type room air conditioners, valued at approximately \$58,317, to Pakistan and Aden during the 22-month period beginning January 1957. This insignificant quantity of exports is primarily because several leading manufacturers who have collaboration agreements with foreign firms are, under the terms of their agreements, precluded from exporting their products. Secondly, the domestic demand for these products is so heavy that few manufacturers are inclined at present to explore new markets.

Market Potential and Investment Opportunities

A natural local market exists for air conditioning and refrigeration equipment, and since World War II the people have become more and more air conditioning conscious. Although only a few homes

have air conditioning in any form, industrial and commercial applications continue to increase. Residential and industrial air conditioning and refrigeration will undoubtedly increase considerably in coming years because of the gradual improvement of economic conditions, and a greater need for climate control.

Prospects are excellent for the local manufacture of air conditioning and refrigerating equipment by United States companies, in collaboration with domestic interests. Consumers have always shown a marked preference for American equipment. However, the Government does not favor mere assembly operations, and interested firms would be required to enter into firm commitments regarding their programs of production. Proposals from foreign firms will be considered favorably only if they involve production of equipment and components not presently manufactured in India.

The following excerpts are quoted from the *Bombay Free Press Journal* of April 7, 1959:

Shre Fazal D. Chinoi, President of the Refrigeration and Air Conditioning Trades Association, Appealed to the Government for the Liberalization of imports of essential components by the refrigeration and allied industries.

Basicoly the Association comprises manufacturers and assemblers, engineers and contractors, importers and retailers, including service and maintenance personnel.

There has been an encouraging progress of indigenous production of air conditioning equipment.

The year under review (1958) has been one of great hope to the future of our industry. Dependence on the import of finished goods has given place to indigenous production.

We have today about ten (10) different groups of manufacturers of air conditioners of various capacities in the country. . . . We have the manufacture of industrial air conditioning plants, water coolers, bottle coolers, walk-in coolers, ice cream cabinets etc. It has not yet been possible to assess the total and installed capacity of these items and also their actual production individually.

. . . it can be roughly estimated that 80 percent of the components including centrifugal fans, chillers, air ducts, cooling towers, condensers, cooling coils, motors, etc. are being made locally and the remaining 20 percent of the components which are to be imported cover compressors and controls such as thermostats, relays, etc. The total turnover of all these locally manufactured items may roughly be estimated to be on the order of ten crores.

. . . the demand and supply position is thoroughly unbalanced today. Even the established industries have not been able to produce to their full installed capacity, due to their short-supply of raw-materials needed by the industry which is caused by acute shortage of foreign exchange.

The vital component that is needed to be imported for the manufacture of refrigeration and air conditioning equipment is the compressor, open or sealed type. Unless and until compressors

are being manufactured in the country, we cannot hope to achieve self-sufficiency in the field. . . . I understand that two firms, one in Bombay and another in Calcutta, have been given license under the Industrial (Development and Regulation) Act, 1951, for the manufacture of compressors for domestic refrigerators and air conditioners for the capacity of about 4,000 units each.

While rapid progress is being made in the field of manufacturing,

acute shortage of trained personnel responsible for maintenance and service of equipment is being felt.

It may be that demand upon production at present is so great that the supply is not adequate to the demand. But the pendulum should swing as far in the other direction, sooner or later; and we may enter a time when our productive capacity would be much more than we could actually digest.

Italy

Production

Unitary Air Conditioners.—Production of package air conditioners in Italy has grown slowly but steadily in recent years, reaching an estimated 2,000 units in 1958. The process has been partly the fabrication of the outside metal covering for such units and assembly using imported compressors, and partly complete fabrication. The two major producers, both located in Milan, are *Ercole Marelli* and *Compania Generale Elettrica* (CGE).

Central Plant Air Conditioning Equipment.—The industry received orders for some 45 new marine air conditioning installations in 1958, including an unknown number for ships under construction in foreign yards. Almost all components for marine air conditioning are manufactured in Italy.

Growth has been steady in the newer field of centralized air conditioning of buildings, which has developed only within the past 5 years. In this period, the largest producer, *Marelli*, completed 31 installations involving a total of 8,243 rooms.

Although some individual parts for compressor elements and control instruments may be imported, producers are now thought to be able to manufacture locally almost the complete system. The principal producing firms in this field are *Ercole Marelli*, *Aster* and *Termonova* in Milan, *De Micheli* in Florence and *Termomeccanica Italiana* in La Spezia (naval air conditioning, fabricator of centrifugal compressors).

Refrigerating Equipment.—The Italian refrigerating equipment industry is well developed. So far as known, almost all standard types of refrigerating equipment are manufactured locally. The major producers are *Termomeccanica Italiana* in La Spezia and *Soc. Italiana Pompe e Compressori Worthington* in Milan. At present, production of central refrigeration systems is equally divided between those for use in naval and land-based installations—the latter mostly in cold storage and quick freezing plants, ice-making plants, and plants processing chemicals at low temperatures.

Commercial Refrigerators and Freezers.—Produc-

tion of commercial type and domestic refrigerators reportedly reached a new high in 1958, totaling about 450,000 units, compared with 400,000 in 1957 and 320,000 in 1956. However, one manufacturing source estimates the 1958 total at not more than 400,000 units.

Local sources report that approximately 180,000 compressor units (sealed type) were imported annually in 1957 and in 1958. Therefore, apparently half the production of commercial and household refrigerators represents fabrication and assembly using imported compressor units and half complete fabrication. This proportion will probably change radically in the next several years as production of sealed-unit type compressors under American license expands. Until now Italian production of refrigerator compressors has reportedly been confined pretty much to units of 1 horsepower or less. In the next 2 or 3 years, the country is expected to be able to satisfy almost all its compressor requirements from domestic production.

No data are available on production and consumption of commercial-type refrigerators. Almost all types are fabricated in Italy, using mostly compressor units imported from the United States.

Wage Scales

Under the sliding-scale system in effect, wage rates are tied to the retail price index. In the mechanical industries wages increased 8 percent between July 1957 and August 1958. Reportedly, average hourly earnings of workers in the metal-mechanical and transportation industries as of April 1958 amounted to 241.03 lira (US \$0.39). These industries include foundries (2^a fusione); various mechanical establishments; electrical machinery and equipment; and vehicles and transportation equipment. The above hourly rates do not include vacation and holiday pay, bonuses, family allowances, and other supplemental benefits that amount to approximately 65–70 percent of basic wages. Social security contributions, almost wholly payable by the employer, are over and above the “take home” pay and represent an additional cost to the employer

that is equivalent to about 75 percent of the "take home" pay. The above wages are the minimum established under the national labor contract. Most leading firms in the Milan area pay higher wages—from 10–20 percent of the basic rate—to skilled workers in order to retain their services.

Channels of Distribution

Distribution of package air conditioners is handled normally through retail stores, but some of the leading manufacturers (C'GE, Marelli, Electrolux, Siemens) also operate their own retail outlets. For the most part, wholesale distribution is handled by the manufacturers themselves (or by an exclusive import agent in the case of imported products) direct to authorized retail stores. Authorized sales agents as well as domestic manufacturers offer complete servicing facilities. Sales of air conditioning systems, industrial refrigeration equipment, and commercial refrigerators are made direct from producers or importers to consumers.

Consumption

Air Conditioning Equipment.—Current annual consumption of package air conditioners is estimated at about 3,500–4,000 units, of which 2,000 are produced domestically and 1,500–2,000 are imported. Consumption has been increasing slowly, and trade sources do not expect any dramatic expansion because of the relatively high price of such units (\$320 for a $\frac{3}{4}$ hp. unit), the high cost of installation, and high operating cost. Sash windows are rare, French windows being the rule, so considerable alteration is required for satisfactory installation of window air conditioners. The fact that electricity costs three to five times as much in Italy as in the United States puts the use of household air conditioners in the "luxury" class. However, the use of self-contained room air conditioners in restaurants and coffee bars is growing, and consumption is expected to expand steadily.

The largest number of centralized air conditioning systems, 15 in the past five years, were for new office buildings, mostly in Milan, and 12 were in new hotels located throughout Italy. The remaining installations were for three new telephone exchanges and a hospital. Other end-uses were in large department stores, movie theaters, and deluxe confectionery stores. Demand from industrial firms for the air conditioning of factories and laboratories is expected to increase steadily.

Refrigeration Equipment.—The principal consumers of refrigeration equipment in Italy as in other countries, are shipyards, the canned food industry,

slaughter houses, cold storage warehouses, and the chemical industry. Sales declined 20 percent in 1958, after several years of sharp increases in demand—about 20 percent annually. Part of the decline was attributable to a temporary slowdown in capital investment by private industry. Continued steady growth is expected now that increased emphasis is on commercial refrigeration and processing of fruits and vegetables in order to take fullest advantage of the European common market. Increases in commercial refrigerator sales have also been influenced by "self service" in food marketing.

Prices are reportedly high by American standards. Manufacturers' retail prices for commercial refrigerators on December 20, 1958, were as follows—wholesale prices being 10–15 percent below retail prices:

<i>Commercial, reach-in type (liter size)</i>	<i>Recommended retail price</i>	
400	\$435	
600	503	
900	653	
1,200	734	
1,500	789	
2,000	870	
2,500	1,034	
3,000	1,251	
<i>Display cases (meter length)</i>	<i>Glass enclosed</i>	<i>Self-service</i>
2	\$1,040	\$1,152
2.5	1,168	1,373
3	1,360	-----

Import Duties

Tariff No.		General	Conventional	Temporary
		<i>Take Lowest Rate</i>		
84.15 c-2	Complete refrigerators (refrigerated cabinets, tanks, refrigerated benches, refrigerating display windows, refrigerated fountains, and the like) weighing per unit: (a) over 500 kg	45	18 GATT	16
	(b) 500 kg or under	80	22 GATT	20
84.15 c-1	Insulated refrigerator cabinets (not fitted with their refrigerating equip.), isothermic furniture, ice cream freezers, and the like	35	23 GATT	21
84.15 a	Refrigerative units of which the constituent elements are fixed on a common base: (a) compressor type, weighing per unit: (1) over 250 kg	45	18 GATT	16
	(2) 250 kg or less	80	Switz 22 GATT	20
	(b) Other absorption, reabsorption, evaporation, etc., types	80	22 GATT	20
84.15 d	Parts and detached parts of refrigerators and refrigerating equipment, electrical and others	35	23 GATT	21
84.17 b	Air heating, air cooling, humidifying and similar apparatus, comprising (in a single unit) a motor driven ventilator, a temperature changer, with or without filters, control devices, burners, humidifiers. 1. without refrigerating equipment	40	18 GATT	-----

Tariff No.		General	Conventional	Temporary
		<i>Take Lowest Rate</i>		
ex.	Air conditioning units for the textile industry.....		18 Switz	-----
	2. with refrigerating equipment.....	40	18 GATT	-----
84.17 c	Detached parts (heat exchangers, humidifiers, etc.).....	40	18 GATT	-----

Other Taxes on Importation: Sales or turnover tax=3 percent of duty paid value. Compensatory import tax on 84.17 b = 4 percent of duty paid value. On the others, 3 percent of duty paid and sales tax paid value. Application of above duties and taxes: CIF Value \times lowest duty \times 1.03 \times 1.04 (if applicable) \times 1.03.

Foreign Trade

The only official statistics available on the Italian industry are those on foreign trade. These statistics are broken down into the following categories: Air conditioning units, with and without refrigeration equipment; complete refrigerators of all types; and

equipment and components for refrigerators. According to local sources, compressor units for air conditioners and refrigerators, the largest single item imported from the United States, are included in either "air conditioning units with refrigeration equipment" or "equipment and components for refrigerators," depending upon intended end-use.

However, even the trade association (*Associazione Nazionale Industrie Elettroteche* (ANIE), Milan) is unable to supply data or firm estimates on the number, type, and value of compressor units or other components imported. Further details on the composition of imports might be obtained by analysis of export statistics of the United States and West Germany, the principal sources of air conditioning and refrigeration products.

Italy: Estimated Capacity, Production, and Sales of Industrial and Commercial Refrigeration Equipment, 1958

[Value in \$1,000; 625 lire equals US \$1]

Standard power in F/h ¹	Capacity		Production		Sales	
	Number of complexes ²	Value	Number of complexes ²	Value	Percent domestic	Percent foreign
Freon:						
10,000- 20,000.....	130	288	65	144	60	40
20,000- 80,000.....	130	560	50	224	60	40
80,000-170,000.....	65	624	15	144	80	20
170,000-500,000.....	20	680	10	336	60	40
NH 3:						
10,000- 30,000.....	130	344	45	120	90	10
30,000- 70,000.....	65	624	15	144	80	20
70,000-250,000.....	40	512	25	320	70	30
250,000-800,000.....	20	320	5	80	90	10
Total.....	600	3,952	230	1,512		

¹ F/h = 3.97 B.T.U./h.

² Complexes include all material normally required for a central refrigeration installation, e.g. compressors, condensers, evaporators, valves, and tubing. Source: A major Italian producer of refrigeration equipment.

Italy: Exports of Air Conditioning and Refrigerating Equipment, 1956-58

[Quantity in metric tons; value in \$1,000]

Commodity and country of destination	1956		1957		1958	
	Quantity	Value	Quantity	Value	Quantity	Value
No. 4235—Air-conditioning without refrigerating equipment:						
Portugal.....	0	0	34	117	29	82
Algeria.....	23	24	1	2	2	5
Belgium-Luxembourg.....	7	7	2	3	4	9
Spain.....	43	184	0	0	2	3
Other countries.....	117	98	125	136	48	144
Total.....	190	313	162	258	85	243
No. 4236—Air-conditioning with refrigerating equipment:						
Spain.....	28	92	14	38	14	64
Argentina.....	5	12	0	0	0	0
Yugoslavia.....	0	0	22	27	4	11
Other countries.....	4	12	24	89	8	40
Total.....	37	116	60	154	26	115
No. 4237—Air-conditioning parts:						
Portugal.....	2	3	2	2	0	0
United Kingdom.....	1	4	1	7	0	0
India.....	0	0	54	87	0	0
Netherlands.....	0	0	0	0	37	61
Other countries.....	2	7	24	46	31	142
Total.....	5	14	81	142	68	203

Italy: Exports of Air Conditioning and Refrigerating Equipment, 1956-58—Continued

[Quantity in metric tons; value in \$1,000]

Commodity and country of destination	1956		1957		1958	
	Quantity	Value	Quantity	Value	Quantity	Value
No. 4258—Complete refrigerators over 500 kilograms:						
Spain.....	125	215	0	0	0	0
Cuba.....	10	26	2	6	0	0
Venezuela.....	14	30	13	35	16	34
Austria.....	0	0	45	42	51	50
Yugoslavia.....	0	0	47	112	40	48
Other countries.....	44	84	46	106	88	169
Total.....	193	355	153	301	195	301
No. 4261—Compressor type refrigerating units over 250 kilograms:						
France.....	6	10	0	0	0	0
Yugoslavia.....	3	6	61	84	10	18
Venezuela.....	0	0	1	2	2	2
Other countries.....	1	3	17	38	7	22
Total.....	10	19	79	124	19	42
No. 4263—Other refrigerating equipment:						
Switzerland.....	5	3	3	4	0	0
Libya.....	10	3	0	0	2	7
Yugoslavia.....	0	0	2	9	6	20
Brazil.....	0	0	0	0	5	4
Other countries.....	1	2	7	11	3	10
Total.....	16	8	12	24	16	41

Source: *Statistica del Commercio con Estera*, Central Institute of Statistics, Rome.

Italy: Imports of Air Conditioning and Refrigerating Equipment, 1956-58

[Quantity in metric tons; value in \$1,000]

Commodity and country of origin	1956		1957		1958	
	Quantity	Value	Quantity	Value	Quantity	Value
No. 4235—Air-conditioning without refrigerating equipment:						
United States.....	83	181	111	292	104	289
France.....	4	6	2	7		
West Germany.....	57	86	74	99	47	59
United Kingdom.....	23	61	34	84	41	156
Sweden.....	17	24	4	1	17	22
Other countries.....	7	24	0	5	10	39
Total.....	191	382	225	488	219	565
No. 4236—Air-conditioning with refrigerating equipment:						
United States.....	135	345	202	467	347	889
West Germany.....	25	30	37	54	5	22
Switzerland.....	2	7	0	1	7	7
United Kingdom.....	0	0	1	1	15	65
Other countries.....	0	0	2	9	2	7
Total.....	162	382	242	531	370	991
No. 4237—Air-conditioning parts:						
United States.....	11	29	40	124	11	37
West Germany.....	58	52	127	145	35	89
Sweden.....	11	15	13	21	18	20
France.....	0	0	4	8	44	39
Other countries.....	3	11	2	8	10	34
Total.....	83	107	186	306	118	219
No. 4258—Complete refrigerators over 500 kilograms:						
United States.....	2	5	23	48	9	16
West Germany.....	7	20	0	0	7	10
United Kingdom.....	6	10	0	0	8	13
Other countries.....	2	2	4	9	7	16
Total.....	17	37	27	57	31	55
No. 4261—Compressor type refrigerating units over 250 kilograms:						
United States.....	12	33	36	129	21	69
Austria.....	1	2	0	0	0	0
West Germany.....	7	14	0	0	9	25
United Kingdom.....	48	64	0	0	3	7
Other countries.....	0	0	36	64		1
Total.....	68	113	72	193	33	102
No. 4263—Other refrigerating equipment:						
United States.....	Negligible	Negligible	5	9	9	34
West Germany.....	5	8	0	0	3	8
Netherlands.....	17	6	0	0	5	11
United Kingdom.....	14	18	0	0	0	0
Switzerland.....	0	0	0	0	16	23
Other countries.....	1	2	6	12	5	6
Total.....	37	34	11	21	38	82

Source: *Statistica del Commercio con Estera*, Central Institute of Statistics, Rome.

Japan

The Japanese air conditioning equipment and refrigeration industry has increased its production tremendously in recent years. Production in number of units in 1957 was more than two and one-half times that in 1956. Foreign investments, largely of American origin, have been important in the development of the industry. These have been chiefly in the form of technological assistance contracts, but some equity investments have been made. Indications are that the Ministry of International Trade and Industry (MITI) may approve fewer requests for foreign investment in the future, possibly reflecting confidence in domestic technical competence.

Domestic consumption of package and window-type air conditioning units has shown the greatest increase. However, high domestic prices undoubtedly have inhibited sales. Currently the Government is not approving requests for use of foreign exchange to import household air conditioning, and any future increase in imports is unlikely. Imports of air conditioning and refrigeration equipment, largely for industrial purposes, are from the United States and Western Europe. Equipment is exported chiefly to Southeast Asia. Although domestic consumption of air conditioning equipment as a whole will probably increase, the shortage of foreign exchange renders unlikely—in the absence of important new technological developments overseas—any appreciable increase of imports in the near future.

Production

The principal producing areas are concentrated in Tokyo and Osaka, followed by Tochigi and Kanagawa Prefectures. Most firms manufacture all major parts, such as compressors, and assemble the complete units. Items such as valves, thermostats, and some auxiliary apparatus are usually supplied by small subcontracting firms.

Substantial increases in production were made during the period 1955–57. Until 1955, the manufacturers used, to a considerable extent, imported parts, such as specific types of valves and thermostats, which were substantially superior to Japanese

grades. However, because of recent technical improvements, domestic producers now account for almost 95 percent of total requirements of raw materials and parts. MITI's import approval is limited to specific parts of marine air conditioning and refrigeration equipment, the majority of which are used on ships built for export. Labor and power are in adequate supply.

Foreign investments guaranteeing the right to remit future profits in foreign exchange must be approved by the Government, under the provisions of the Foreign Investment Law. Postwar investment of foreign capital began in 1949. Foreign investments in air conditioning and refrigeration equipment have been in three forms: Technological assistance contracts, acquisition of stocks and proprietary interest, and acquisition of claimable assets arising from loans. Foreign investments validated by the Government were as follows during the period 1949–58:

Validated Foreign Capital Investment in Japan's Air Conditioning and Refrigeration Equipment Industry, 1949–1958

TECHNOLOGICAL ASSISTANCE CONTRACTS

1. Date of validation.
2. Country of origin of investor.
3. Technique.

Ishikawajima Jukogyo K. K. (Ishikawajima Heavy Industries Co., Ltd.)

54 Tsukudajima, Chuo-ku, Tokyo

1. March, 1953.
2. U.S.A.
3. Manufacture of ice-making machines.

Mitsui Zosen K. K. (Mitsui Shipbuilding & Engineering Co., Ltd.)

Mitsui Bldg., Muromachi, Nihonbashi, Chuo-ku, Tokyo

1. December, 1953.
2. Switzerland.
3. Manufacture of rotary piston compressors for refrigeration equipment and other heat pumps.

Nihon Sabroe K. K. (The Sabroe Co. of Japan, Ltd.)
Nisan Seimei Bldg., 8 Eiraku-cho, Kitz-ku, Osaka

1. 1926.
2. Denmark.
3. Manufacture of refrigeration systems for marine use.

Niigata Worthington K. K. (Niigata Worthington Co., Ltd.)

11 Suda-cho 2-chome, Kanda, Chiyoda-ku, Tokyo

1. October, 1953.
2. U.S.A.
3. Manufacture of compressors and pumps.

Toyo Cargocaire K. K. (Toyo Cargocaire Co., Ltd.)

51 Saioji-machi, Shiba, Minato-ku, Tokyo

1. 1954.
2. U.S.A.
3. Manufacture of ventilating and dehumidifying systems for cargo holds and other marine uses.

Toyo Carrier Kogyo K. K. (Toyo Carrier Industry Co., Ltd.)

24 Kabuto-cho 3-chome, Nihonbashi, Chuo-ku, Tokyo

1. March, 1951.
2. U.S.A.
3. Manufacture of air conditioning machines, and the like.

ACQUISITION OF STOCKS AND PROPRIETARY INTEREST

1. Date of Validation.
2. Country of origin of investor.

Niigata Worthington K. K. (Niigata Worthington Co., Ltd.)

11 Suda-cho 2-chome, Kanda, Chiyoda-ku, Tokyo

1. March, 1951; June 1953; and August 1955.
2. U.S.A.

Tokyo Shibaura Denki K. K. (Tokyo Shibaura Electric Co., Ltd.)

2. U.S.A.
Air conditioning and refrigeration equipment.

Mitsubishi Denki K. K. (Mitsubishi Electric Manufacturing Co., Ltd.)

Air conditioning and refrigeration equipment.

ACQUISITION OF CLAIMABLE ASSETS ARISING FROM LOANS

1. Date of Validation.
2. Country of origin of investor.

Toyo Carrier Kogyo K. K. (Toyo Carrier Industry Co., Ltd.)

24 Kabuto-cho 3-chome, Nihonbashi, Chuo-ku, Tokyo

1. March 1951; April 1954; and September 1954.
2. U.S.A.

The only wage scale information obtainable from reliable sources is the total amount and monthly average of salaries paid to all employees in the industry in 1955. The following data were obtained from MITI:

Salaries paid to all employees, annual total	\$3,025,001
Salaries paid to all employees, monthly average		\$252,084
Number of permanent employees, total	5,495
Average monthly salary per employee	\$46

Channels of Distribution

Most manufacturers have arrangements with subcontractors or specially designated shops to install air conditioning and refrigeration equipment. From the factories, the products are shipped direct to these installations contractors. However, some of the large manufacturers do their own installing. Department stores also handle retail and some wholesale sales of air conditioning equipment.

Consumption

Production of most types of air conditioning and refrigeration equipment have increased steadily during the past few years, paralleling growth trends in domestic consumption. MITI's statistics show production or shipments of air conditioning and refrigeration equipment from 1953-57 as follows:

Year	Value	Percent (1953 = 100)
1953	\$7,101,310	100
1954	9,883,603	139.2
1955	13,218,073	186.1
1956	17,844,709	251.3
1957	15,840,570	223.1

The above data includes reciprocating, centrifugal, and absorption systems but excludes ice cream freezers, ice cream stockers, water coolers, and household refrigerators.

Shipments of package-type and window-type air conditioning and centrifugal refrigeration equipment increased conspicuously between January-June 1957 and January-June 1958. Estimates of future consumption are not available. Data on shipments in the first 6 months of 1958 show a remarkable increase in window-type air conditioners. In the January 1957-June 1958 period, reciprocating and

absorption refrigeration equipment, ice cream freezers, and water coolers declined. Consumption of equipment for industrial use should follow closely the future business trends of heavy industries. Consumption of window-type air conditioners will probably increase even more. Tendencies toward economic recovery noted during the last quarter of 1958 indicated that those types which declined in 1957 and the first half of 1958 may increase in 1959.

Major appliance producers recently reduced prices for household room air conditioners, hoping to encourage buying by the medium-level income group as well as by the high income group. One manufacturer consulted pointed out that the typical well-ventilated Japanese style room requires an air conditioner having about twice the capacity of one needed to cool to the same degree a western-style room of equal size. Consequently, he expects that these air conditioners will be purchased mainly for use in apartments, western style houses, or in the western style parlor or guest room found in most homes owned by wealthy or middle-class persons. Because these rooms are usually small, the $\frac{1}{2}$ - $\frac{3}{4}$ hp. air conditioners are expected to account for the majority sold in consequence of the price reduction.

Following are the price reductions made by one representative manufacturer:

<i>Commercial refrigerators</i>	<i>1958 Price</i>	<i>1959 Price</i>
7.7 cubic ft.....	\$558	\$464
11.0 cubic ft.....	689	639
<i>Household air conditioners</i>		
$\frac{1}{2}$ hp.....	Not on sale	275
$\frac{3}{4}$ hp.....	722	444
$\frac{3}{4}$ hp.....	694	444
1 hp.....	931	597
$1\frac{1}{2}$ hp.....	1,292	1,042
5 hp.....	1,917	1,472

Air Conditioning Equipment.—Air conditioning equipment is mainly used in western style buildings, such as offices and apartments. Design and construction of the average residence presents a considerable obstacle to widespread residential use of room or window-type air conditioners. All equipment is classified under one of three categories: Central system; unit system—including package type air conditioners and unit coolers—(window type, console floor type, ceiling type); and automobile air conditioners.

These air conditioners are used in office buildings, hotels, theaters, hospitals, railway cars, department stores, restaurants, warehouses, power transmitting stations, photofilm developing dark room studios, libraries, and similar buildings. A relatively small

quantity of automotive vehicle air conditioners are consumed, mainly in the manufacture of high class sightseeing buses for domestic and export uses.

Refrigeration Equipment.—All refrigeration equipment is classified under one of the following categories:

Reciprocating System.—Ammonia refrigeration machines, Freon condensing units, and high speed multicylinder compressor units. Major consumers are ice making plants, cold storage plants, food processing and preservation industries, synthetic fiber, soda, and pharmaceuticals;

Centrifugal System.—Centrifugal refrigeration machines, rotary compressors, and gear compressor type units. Used mainly for department stores, office buildings, theaters, hotels, and similar large buildings;

Absorption System.—Produced in relatively small quantities; consumers are limited to ships, gas plants, and the like.

Imports

Import duties on air conditioning and refrigeration equipment are as follows: All refrigerators, air conditioners, and freezing units fall under the tariff classification of Machinery, not specifically provided for, at the ad valorem rate of 15 percent. Parts for this equipment fall in the category of Parts of Machinery, not specifically provided for, at the ad valorem rate of 15 percent.

A commodity tax of 40 percent, plus tariff, is levied on the landed price of the following classes of refrigerators and parts:

Electric refrigerators and gas refrigerators, excluding those having a box of 50 or more cubic feet or those having a special apparatus keeping temperature at a constant level.

Freezing machines employed for these refrigerators (limited to the machines of less than $\frac{1}{4}$ H.P.).

No regulations apply specifically to the import or export of refrigeration equipment. However, as for all imports, foreign exchange and import licenses must be obtained.

Due to balance of payments difficulties the use of dollar exchange is limited to the importation of essential goods. Therefore, imports of package air conditioners are likely to be small in the future.

Market Potential

MITI permits no imports of equipment—complete sets or compressors—except for the following:

Nondraft (not involving foreign exchange remittance) imports, e.g. those sent from overseas firms to their branch offices; equipment brought into this country for use in foreign trade fairs, etc.; refrigeration equipment for export ship construction, which is fitted at the request of the foreign ship buyers; and equipment imported in accordance with special trade agreements.

MITI allows the importation under the fund allocation system of certain parts such as special valves, thermostats, carbon seals, shock absorbers, and burners, which are not yet economically produced by the domestic manufacturers. However, approval is limited to parts used in industrial refrigeration equipment. In an attempt to foster general industrial welfare and productivity, MITI considers the ultimate use of machinery or equipment in which imported parts are to be utilized, as well as the type of part concerned, in any given application for foreign exchange.

Import approval might be granted for parts of large refrigerators designed for factory use, but would probably be denied for office air conditioners or equipment for nonindustrial use. This would not be of direct benefit to a particular industrial operation. According to a MITI official, parts are imported because of lower cost rather than domestic manufacturing inability. As technological improvements result in lowered production costs, the necessity of importing parts will decrease. Further introduction of foreign technical assistance agreements in parts manufacturing is not likely.

The possibilities of increasing United States exports are slight. As a result of overseas up-to-date technology introduced into Japan, Japanese manufacturers claim that their industry has attained a technical level comparable to that of foreign manufacturers. A gulf still exists between sales prices of

foreign and domestic products in some types. For example, the cost-insurance-freight (c.i.f.) Japan price of the larger American made window-type air conditioners is approximately one half the market price of the corresponding domestic product. Imports of these air conditioners are still limited by the foreign exchange budget.

Prices of other types of domestic air conditioners and some types of refrigeration equipment do not differ greatly from the imported products. Therefore, the interest of importing wholesalers is concentrated in those machines which are not now produced in Japan at reasonable prices. However, the steady growth of the domestic industry renders extremely doubtful large scale imports of such equipment in the future.

Investment and Licensing Opportunities

The lack of new technological assistance or licensing agreements within the past 3 years and the growth of the domestic industry may indicate that Government officials feel little need for further introduction of foreign technology. Moreover, the Finance Ministry as a general policy apparently desires to limit the approval of foreign investments to cases of public utilities, key industries, or major export industries. However, the Government considers each investment request on the basis of the level of technical development in the field concerned, and the domestic balance of payments position.

United States manufacturers have little opportunity for additional licensing or other arrangements whereby the domestic market might be made more accessible to United States products. Both industry and Government favor arrangements for the outright purchase of new techniques, rather than licensing agreements involving high rates or long term royalty payments.

Japan: Value of Shipments of Air-conditioning and Refrigeration Equipment, by Prefecture, for Calendar Year 1955

Type	Total	Tokyo	Osaka	Tochigi	Kanagawa	Others
Air-conditioning equipment.....	\$2,858,332	\$1,272,222	\$730,555	\$347,222	\$33,333	\$475,000
Refrigeration equipment, except household.....	15,977,767	5,094,444	3,583,333	1,380,556	161,111	5,758,323
Parts of air-conditioning and refrigeration equipment.....	3,374,999	2,388,889	436,111	69,444	36,111	444,444
Total.....	22,211,098 (100%)	8,755,555 (39.4%)	4,749,999 (21.4%)	1,797,222 (8.1%)	230,555 (1.0%)	6,677,767 (30.1%)

Note: Discrepancies in totals are due to currency conversion.
Source: Ministry of International Trade and Industry, Tokyo.

Japan: Manufacturers' Shipments of Air Conditioning and Refrigeration Equipment, 1957

Commodity	Units	Metric tons	Dollars
Air conditioning equipment:			
Package type.....	5,790	N.A.	11,126,059
Window type.....	1,696	N.A.	1,168,406
Other types.....	7,814	N.A.	2,470,456
Total.....	15,300	N.A.	14,764,921
Refrigerating equipment:			
Reciprocating system.....	17,292	7,457	11,068,189
Centrifugal system.....	235	1,732	3,465,853
Absorption system.....	534	150	217,339
Total.....	18,061	9,339	14,751,381
Other refrigerators:			
Ice cream freezers.....	1,761	N.A.	1,137,201
Ice cream stockers.....	12,165	N.A.	2,340,487
Water coolers.....	3,870	N.A.	1,116,801
Total.....	17,796	N.A.	4,594,489

N.A.—Not available.
Source: Ministry of International Trade and Industry, Tokyo.

Japan: Production of Air Conditioning and Refrigerating Equipment, 1955-57

Commodity ¹	Units	Metric tons	Dollars
<i>1955</i>			
Air-conditioning equipment, total.....	N.A.	N.A.	N.A.
Industrial and commercial refrigerating equipment, total.....	20,216	14,525	13,218,072
<i>1956</i>			
Air-conditioning equipment, total.....	3,603	N.A.	4,347,886
Industrial and commercial refrigerating equipment, total.....	38,460	16,490	17,844,708
<i>1957</i>			
Air-conditioning equipment, total.....	17,672	N.A.	18,153,483
Package type.....	7,437	N.A.	14,062,272
Window type.....	2,385	N.A.	1,481,325
Other types.....	7,850	N.A.	2,609,886
Industrial and commercial refrigerating equipment, total.....	20,386	10,874	15,840,569
Reciprocating system.....	19,601	8,995	12,162,522
Centrifugal system.....	251	1,729	3,460,708
Absorption system.....	534	150	217,339
Other refrigerators, total.....	252,492	N.A.	5,029,200
Ice cream freezers, total.....	1,599	N.A.	1,046,567
Ice cream stockers, total.....	15,189	N.A.	2,719,236
Water coolers, total.....	4,463	N.A.	1,263,397

N.A.—Not available.
¹ Arranged according to MITI's statistical classification.
Source: Ministry of International Trade and Industry, Tokyo.

Japan: Value of Manufacturers' Shipments of Air Conditioning and Refrigerating Equipment, 1957 and January-June, 1958

Commodity	January-June 1957	July-December 1957	January-June 1958
Air conditioning equipment:			
Package type.....	\$5,863,889	\$5,261,110	\$7,658,333
Window type.....	697,222	469,444	1,116,667
Other types.....	930,556	1,538,889	533,333
Total.....	7,491,667	7,269,443	9,308,333
Refrigerating equipment:			
Reciprocal types.....	6,344,444	4,725,000	4,744,444
Centrifugal types.....	1,280,556	2,186,111	1,733,333
Absorption types.....	133,333	83,333	58,333
Total.....	7,758,333	6,994,444	6,536,110
Others:			
Ice cream freezers.....	1,125,000	11,111	477,778
Ice cream stockers.....	2,283,333	55,556	2,902,777
Water coolers.....	330,556	786,111	288,889
Total.....	3,738,889	852,778	3,669,444

Source: Ministry of International Trade and Industry, Tokyo.

Japan: Imports of Air-conditioning and Refrigerating Equipment, 1955-57

Commodity and country of origin ¹	1955			1956			1957		
	Units	Kilograms	Dollars	Units	Kilograms	Dollars	Units	Kilograms	Dollars
Air-conditioning equipment:									
Ryukyu Islands.....		199	750						
Sweden.....		9,883	19,359						
United Kingdom.....		75	178						
United States.....		61,525	203,051						
Total.....		71,682	223,338						
Air-conditioning equipment self-contained, 5 horsepower or more, not elsewhere specified:									
United States.....				612	123,442	306,433	714	212,111	684,703
Denmark.....				165	52,385	259,755	78	36,328	53,219
United Kingdom.....							66	216	917
Belgium.....				6	2,514	6,275	12	4,389	1,406
Total.....				789	178,753	573,933	885	284,307	818,722
Air-conditioning parts:									
United States.....					4,525	28,741		16,020	74,119
United Kingdom.....					17,768	35,883		17,426	71,892
Denmark.....					3,524	9,152		2,891	7,350
Total.....					25,817	73,778		37,273	161,031

Japan: Imports of Air-conditioning and Refrigerating Equipment, 1955-57—Continued

Commodity and country of origin ¹	1955			1956			1957		
	Units	Kilograms	Dollars	Units	Kilograms	Dollars	Units	Kilograms	Dollars
Electric refrigerator, excluding compressor-type, capacity exceeding 0.416 cubic meters (5 cubic feet):									
Sweden.....							121	19,600	35,249
United Kingdom.....							119	16,088	24,719
United States.....							54	6,289	9,044
Total.....							297	42,167	69,286
Electric refrigerators, not elsewhere specified:									
Sweden.....				89	14,053	25,108	21	2,413	4,492
United Kingdom.....				306	27,905	35,492	26	1,486	2,533
United States.....				349	70,624	34,031	40	5,182	4,656
Total.....				768	114,669	98,561	98	10,149	13,625
Parts of refrigerators, not elsewhere specified:									
Hong Kong.....								68	8
Sweden.....								972	769
United States.....								117,345	9,272
Total.....								118,441	10,428
Refrigerators, over 100 kilograms:									
Sweden.....		13,170	26,798	6	966	1,739			
Denmark.....		10,112	32,981	10	29,940	180,030		2,891	7,350
United Kingdom.....		409	128					17,426	71,892
United States.....		122,657	144,923	321	173,658	224,272		16,020	74,119
Total.....		146,348	206,034	347	244,363	491,700		37,273	161,031
Refrigerator parts:									
Denmark.....					2,826	7,047		268	583
United Kingdom.....					9,204	18,322		38	16,583
West Germany.....					2	11		841	556
Norway.....								3,628	7,411
United States.....					23,077	40,419		125,711	117,247
Total.....					35,455	66,347		130,497	142,500
Ice-cream freezers:									
Denmark.....				3	13,694	90,281	10	38,287	321,064
United States.....				32	10,344	19,736	75	42,841	28,369
Total.....				37	24,413	110,322	85	81,128	349,433
Electric refrigerator self-contained units:									
Ryukyu Islands ²		1,608	2,831						
Sweden.....		12,975	23,259						
United States.....		226,967	62,758						
Total.....		242,932	90,678						
Mechanical refrigerator, self-contained, not elsewhere specified:									
Sweden.....		280	481						
United Kingdom.....		4,114	181						
United States.....		2,016	2,217						
Total.....		6,670	3,539						
Electric refrigerator capacity exceeding 0.19824 cubic meters (7 cubic feet):									
Sweden.....				50	7,849	14,156			
United Kingdom.....				60	41,447	7,028			
United States.....				1,419	331,882	191,706			
Total.....				1,537	382,395	215,261			
Electric refrigerator, compression type, capacity exceeding 0.1416 cubic meters (5 cubic feet):									
Sweden.....							19	3,202	5,261
United Kingdom.....							177	15,038	30,392
United States.....							1,802	456,843	204,947
Total.....							2,007	476,506	243,828
Electric refrigerator, compression-type, not elsewhere specified:									
Sweden.....							5	635	942
United Kingdom.....							120	8,590	18,681
United States.....							146	62,241	16,737
Total.....							280	72,045	37,672

¹ Totals include small amounts from countries other than those listed.

² Probably equipment sold by U.S. military personnel.

Source: Japanese Ministry of Finance; *Annual Returns of the Foreign Trade of Japan*, Japan Tariff Association, Tokyo.

Japan: Exports of Air-conditioning and Refrigerating Equipment, 1955-57

Commodity and country of destination ¹	1955			1956			1957		
	Units	Kilograms	Dollars	Units	Kilograms	Dollars	Units	Kilograms	Dollars
Air-conditioning equipment:									
Ryukyu Islands		4,040	2,094						
Formosa		1,732	4,831						
Indonesia		6,031	5,639						
Total		12,368	14,453						
Air-conditioning equipment, including self-contained air-conditioning:									
Ryukyu Islands				4	7,262	8,811	3	5,423	21,553
Salvador				24	4,120	7,197			
Formosa							15	1,322	4,453
Burma							92	9,556	25,475
Total				31	13,881	22,781	115	19,482	58,775
Air-conditioning equipment, n.e.s.:									
Korea				25	13,550	20,625			
Yugoslavia				8	212	556			
Formosa							21	69	525
Brazil							44	31,716	22
Total				35	14,498	23,667	70	31,798	581
Air-conditioning equipment parts, n.e.s.:									
Ryukyu Islands					718	800		1,870	3,764
Formosa					4,748	10,986		987	2,166
Philippines					831	4,969			
India								358	200
Total					7,393	17,539		3,468	8,250
Refrigeration, over 100 kilograms:									
Korea		10,936	5,544	1	2,300	400			
Formosa		165,038	175,703	17	241,485	150,619	6	16,116	27,983
Thailand		156,565	117,103	3	3,520	2,422	12	13,995	14,080
South Viet-nam				14	15,785	18,767	19	27,168	31,080
Indonesia				14	9,640	6,497	1	1,500	1,417
Ryukyu Islands				3	1,230	2,178	17	44,057	66,906
Burma		300	694	3	3,273	3,992	4	201,464	120,106
New Hebrides							2	261,724	146,594
Total		336,046	303,472	59	289,895	210,177	68	574,589	478,878
Electric refrigerator, self-contained:									
Korea		839	1,811						
Ryukyu Islands		444	1,022						
Philippines		3,460	2,944						
Total		5,781	8,025						
Mechanical refrigerators, self-contained, n.e.s.:									
Korea		235	150						
Ryukyu Islands		2,005	681						
Philippines		3,012	867						
Total		5,299	1,928						
Refrigerator parts, n.e.s.:									
Ryukyu Islands					5,160	2,319		21,269	11,542
Formosa					79,393	25,947		31,246	17,983
South Viet-Nam					6,880	7,200		723	1,328
Burma					355	278		33,100	20,819
New Hebrides								98,696	
Total					97,424	41,431		198,164	77,761
Ice cream freezers, powered:									
Ryukyu Islands				109	8,597	29,561	26	2,084	9,467
Indonesia				27	1,415	4,764			
Venezuela				16	38	186			
Peru				30	65	336			
Panama				3	7	31	30	45	306
Thailand				8	42	169	33	145	1,233
Total				206	12,427	40,228	209	16,076	53,986
Electric refrigerators, capacity exceeding .19824 cubic meters (7 cubic feet):									
Ryukyu Islands				7	650	1,072			
Thailand				20	1,400	2,428			
Total				30	2,450	4,336			
Parts of mechanical refrigerators, n.e.s.:									
Ryukyu Islands					1,250	508		2,411	2,083
Formosa					760	2,314		2,500	3,036
Total					2,078	3,453		4,913	5,356

Japan: Exports of Air-conditioning and Refrigerating Equipment, 1955-57—Continued

Commodity and country of destination ¹	1955			1956			1957		
	Units	Kilograms	Dollars	Units	Kilograms	Dollars	Units	Kilograms	Dollars
Electric refrigerator, compressor type, capacity .1416 cubic meters (5 cubic feet):									
Korea.....							6	844	1,572
Ryukyu Islands.....							27	2,215	3,694
Burma.....							270	38,660	89,381
Total.....							317	43,043	96,806
Electric refrigerator, compressor type, n.e.s.:									
Ryukyu Islands.....							111	7,914	12,536
Thailand.....							25	2,050	2,119
Burma.....							180	14,420	28,969
Total.....							354	27,094	47,086
Electric refrigerator, including compressor type, capacity exceeding .1416 cubic meters (5 cubic feet):									
Korea.....							5	301	822
Formosa.....							2	380	1,326
Total.....							7	681	2,178
Electric refrigerator, including compressor type, n.e.s.:									
Ryukyu Islands.....							34	2,338	4,100
Burma.....							200	18,400	45,583
Total.....							236	20,873	49,947

n.e.s.—not elsewhere specified.

¹ Totals include small amounts to countries other than those listed.

Source: Japanese Ministry of Finance, *Annual Return of the Foreign Trade of Japan*.

Mexico

Production

No firms in Mexico manufacture all parts of air conditioning and refrigeration equipment. The term "manufacturer" is applied to a firm which manufactures some parts and imports other parts and component equipment for local assembly. For example, ventilation grills are produced locally, and air conditioning grills are imported. Other firms specializing in design and installation work justify the title "manufacturer" by pointing out that installation of central plant conditioning systems requires some degree of design and fabrication.

There are 24 major refrigeration equipment plants in operation. However, unit production varies greatly. Some plants produce only 25 units per year; others produce a thousand or more. In addition to these major producers, at least 15 or 20 small firms turn out a few units each year, ordinarily manufacturing only cabinets. The industry structure is such that no contractor-installer-factory representative purchases equipment from other local installer-assemblers.

Major areas of production of refrigeration equipment are: Mexico, D. F.; Monterrey, Nuevo Leon; Guadalajara, Jalisco; and Celaya, Guanajuato. Of the 24 large firms in the industry, 15 are in the Mexico, D. F., 4 in Monterrey, 2 in Guadalajara, 1 in Celaya, and 2 in Torreon (Coahuila).

Manufacturing assembly plants of air conditioners are located only in Monterrey and Mexico, D. F. Of a total of 11 producing facilities, 7 are located in Monterrey.

Except for imported basic mechanisms, all raw materials and parts are freely available in Mexico. An aluminum rolling mill manufactures stamped coils for air conditioning units under contract to a plant in the Mexico City area. In the future, the firm may produce coils for all companies not having their own stamping facilities.

Labor, largely semiskilled, is freely available. However, training on the job is required. Salaries vary significantly between areas, but the average semiskilled laborer receives 25-30 pesos (12.5 pesos

equals U.S. \$1.00) for an 8-hour workday except in Mexico, D. F., where he is paid 50 pesos. Social services such as medical care, recreational facilities, food, housing, and education represent a 10 percent addition to salary. However, such fringe benefits are more common in plants manufacturing domestic refrigerators and other metal products.

The air conditioning industry is divided between foreign and domestic ownership, but the Government is now employing domestic investment. The largest firm in the industry, which does not produce unrelated products, is entirely Mexican. Most air conditioning units are made by Mexican or primarily Mexican-owned firms utilizing United States patents and designs. These firms either pay royalties or offer percentage participation as minority share holders for the patents and designs.

The industry is not directly subsidized by the Government. However, firms which have been conceded benefits under the "Law for New and Necessary Industries" are in effect subsidized. They receive reductions in import duties, income taxes, and mercantile taxes for a period of 5-10 years. For a company to qualify under the law, domestic labor and materials must represent no less than 60 percent of the product's cost, and 10 percent of the finished product must be produced in the firm's plant. Because of these stipulations in the law, all producers have not yet qualified.

Most refrigeration firms are completely owned by nationals or residents, although some producers utilize foreign trademarks and patents.

Unitary Air Conditioners.—The closest approximation to "manufacture" of air conditioning equipment is the production of package air conditioning units. Local firms manufacture the sheet metal component parts of the blower assembly, the blower motor, the internal shroud, the cabinet, the front or facade (both metal and plastic), and metal parts such as coils, tubing, nuts, and bolts. All firms import compressor-condenser units or parts for local assembly. Other items imported are sealed units, blower assemblies, motors, controls, and rotors. The assembled units contain varying proportions of

imported and domestically produced parts, depending upon the producer.

No governmental or trade organizations compile data on the quantity of production of air conditioning systems. The following estimates of production are based on information provided by individual firms:

	1957		1958	
	Number	Value	Number	Value
Monterrey.....	2,480	\$744,000	4,695	\$1,408,500
Mexico, D. F.....	500	150,000	1,065	319,500
Totals ¹	2,980	\$894,000	5,760	\$1,728,000

¹ Between 200-300 units are judged to have over 2-ton capacity; values are average cost to dealers.

Central Plant Air Conditioning Equipment.—A number of “manufacturers” of central plant air conditioning, which undertake design and installation work, produce or purchase from small manufacturers accessory equipment such as coils, evaporators, air handling equipment, blowers, sheet metal ducts, diffusers, dryers, humidifiers, and a variety of copper and steel pipe and tubing. The majority of these articles are produced by small shops on a custom basis, or in shops maintained by the installer. The items are for specific projects and usually are not for sale on the open market.

All balanced blower shafts and bearings are imported. Other imported parts are compressors, condensers, diffusers, converters, controls, thermal valves, special connections, filters, ammonia tubing, and purgers.

Estimates on installations of air conditioning units, other than package type, in 1956-1958 are shown below. The majority utilized substantial quantities of domestic parts and design.

Size of system (tons)	Number of installations annually
3-20.....	400
20-100.....	100
100 ton and over.....	10

Refrigeration Equipment.—No commercial or industrial refrigeration equipment is manufactured entirely in the country, and basic mechanisms are imported. However, some accessory parts are produced by domestic firms for their own installation or are farmed out to custom metalworking shops for fabrication.

Commercial Refrigerators and Freezers.—In 1957, 6,000 commercial refrigerators were produced, and in 1958, 8,000. Display cases, reach-in refrigerators, beverage coolers, and soda fountain dispensers accounted for 75 percent of the units produced.

Walk-in freezers are not a leading product in the industry. Many commercial establishments such as small restaurants, bars, and grocery stores use only ordinary household refrigerators.

Channels of Distribution

The major centers of distribution for air conditioning are Monterrey, San Luis Potosi, Durango, and Mexico City. Monterrey is the most important center, and Mexico City is the distribution center south of the 23rd parallel. For refrigeration and commercial refrigerators, the distribution centers are Mexico D. F. and Monterrey.

Package air conditioning (under 2 tons) and commercial (self-contained) refrigeration systems are sold primarily on a retail basis. Depending on the size of the unit, manufacturers of commercial refrigerators either appoint distributors or sell directly to retail outlets or from their own stocks to consumers. The word “distributor” is badly misused in Mexico. A “distributor” in many cases is actually a firm selling over as wide an area as possible, not to retail outlets, necessarily, but to consumers on a retail basis. In the commercial refrigeration field, this is not uncommon. However, the large manufacturers also work through dealers or sell directly to retail outlets, but not to end-users as such. Package air conditioners are often handled by the same retailers, who may buy either from a “distributor” or directly from the factory. A retailer may even classify himself as a distributor, meaning that he looks for sales to consumers over his territory, but sells strictly on a retail basis.

Central air conditioning and refrigeration is installed rather than “distributed,” although some companies deal in units and parts. Except those firms which are exclusively contractors, virtually all dealers are also importers and many are manufacturers of some item. Whether they can be considered as distributors depends largely upon whether they classify their sales as “wholesale” and if they actually stock sufficient units and parts to be able to deliver to a client who has been contacted by a salesman. In no case does a central air conditioning, heavy refrigeration importer-factory representative-installer, although classified as a distributor, actually market products to retail dealers rather than to end-users or contractors.

Consumption

The air conditioning industry has just passed through its pioneering stage, and sales and installations should increase in the future. Although pack-

age units find a ready market in the northern states and coastal areas, the sale of central plant installations still involves an educational and promotional task. The large central plateau of the country, having altitudes of about 5,000 feet and extremes of up to 8,000 feet, does not represent a substantial market for comfort-temperature control air conditioning equipment. However, a large segment of industry is located in the area, and air conditioning for humidification, purification, and industrial temperature control is becoming more and more common.

Textile, pharmaceutical, and chemical plants, and laboratories are the principal consumers. Theaters and hotels are not major consumers, although many have some kind of ventilation system. Office buildings are seldom air conditioned, but a number of the newer ones in Mexico City have ventilating and heating systems, usually in combined installations. The first fully air-conditioned office building is now being built.

In the hot port towns, particularly those attracting large numbers of tourists, hotels and motels are increasing their use of air conditioning. To date, this has usually involved the installation of window or larger package units, but new, large hotels are considering central installations. Dealers point out that knowledge of air conditioning has reached the point where a builder will now ask for quotations on an installation, even though, after examining the price, he will usually decide against the added expense. This represents a degree of progress over the past 10 years.

Installation and service of air conditioning and refrigeration equipment is inadequate. In part, this is a manifestation of a price-conscious market, in which both builders and architects attempt to keep costs to a bare minimum. Few architects consult specialists prior to drawing the plans for large buildings. The country has competent contractors fully capable of providing excellent design, installation, and maintenance service, but they find that price quotations based on a well-planned technical survey of the needs of a given installation are considered to be too high and result in the loss of a considerable number of contracts.

As the use and consciousness of air conditioning and refrigeration increases, the demand for well designed and installed systems can be expected to grow. A U.S. firm, whether exporting or manufacturing in the country, should satisfy itself with the technical competence of its distributors, aiding

where necessary in the training of properly qualified personnel.

Unitary Air Conditioners.—The following estimates on consumption of package air conditioners were developed by the United States Embassy in Mexico, utilizing U.S. import figures and drawing on industry sources:

	1957	1958
Number of Families.....	4,543,000	4,681,000
Dwellings Wired.....	1,281,900	1,578,500

Percent Dwellings Wired ¹..... 32 34

	1957		1958	
	Number	Value	Number	Value
Imports.....	2,917	\$967,969	5,141	\$860,553
Produced.....	2,980	899,000	5,760	1,728,000
Total.....	5,897	1,866,969	10,901	2,588,553
Sales ²	5,100	1,619,000	9,500	2,200,500

¹ There are fewer dwelling units than families in Mexico.
² Values for domestic production are based on import values and cost to dealers.

The United States is virtually the exclusive supplier of assembled package air conditioning units. Mexican import statistics do not show such quantities of imports. Therefore, almost all assembled package units must enter Mexico by way of and for use in the free zones and perimeters of the northern part of Mexico and the hot Yucatan Peninsula. Residents in these areas purchase imported units without paying import duties or being subject to licensing requirements.

These areas are not at present stable markets for domestically produced units because the prices to the consumer are at least 30 percent higher than for imported counterparts. However, these areas are potential markets for domestic producers because the free zones are expected to be closed to imported units.

Package units of ¾- and 1-ton capacity are the most popular sizes. Units over 2-ton capacity accounted for no more than 5 percent of total sales in the last two years. Most units sold are used in homes, offices, and small commercial establishments. The North, the Coastal Regions, and the Tehuantepec Isthmus area in the south are the present and potential market areas and can be expected to remain so.

The Central Plateau area, which includes the Federal District, has a population in excess of 4 million but is a poor market area because extreme temperatures are seldom encountered. For example, in 1958 sales totaled \$3,200 in Guadalajara, Jalisco, a city of 500,000 persons, located at an altitude of 5,000 feet. Sales in nearby Puerto Vallarta, a city

of 70,000 inhabitants on the West Coast, were approximately \$320,000 during the same year.

Total consumption of package units is increasing and should continue for the next few years. Market saturation is not yet approached, and prospects now are better than ever. However, a stiff selling job is necessary.

Based on imports, production, and a rate of obsolescence of about 10 percent during the last 10 years, between 35,000-37,000 units are presently in use. Concentration is heaviest along the United States-Mexican border and in and near the larger coastal cities.

Central Plant Air Conditioning Equipment.—In view of the lack of data on manufacture, assembly, and installation of job-assembled units, only a rough estimate of average annual consumption can be made (see Production).

Refrigeration Equipment.—No statistics on gross refrigerated space are available. However, the number of private and semiprivate warehouses, meat packing plants, and frozen food lockers is small compared to the total population. In contrast to the United States, where the construction and operation of frozen food locker plants is a vital factor in the industry, comparable activity is virtually nonexistent in Mexico except along the United States border.

The largest industrial consumer is the brewing industry, but this industry does not show a growth factor sufficient to justify expectations that it will continue to be a major consumer of new installations. Industrial refrigeration is quite important, and fish-and shrimp-freezing facilities have probably represented the largest rate of growth in recent years. New slaughterhouses, which have a packing-house function, have cold storage facilities, but much of the equipment is not utilized because the slaughter rate barely keeps up with daily demand. Smaller meat packers utilize storage facilities to some degree. The refrigeration of meat, fish, and fruits and vegetables accounted for 75-80 percent of all installations in recent years.

The use of commercial and industrial refrigeration should increase at a pace comparable to that of the electrification of the country. Electrical consumption has increased about 12 percent per year since 1955, and a good portion represents service to areas not previously electrified. Small commercial establishments in these areas either generated their own power for refrigeration units, used ice, or did without. Only a small proportion of refrigerator sales to these establishments will be of the "commercial" type, as proven by past consumption patterns.

Commercial Refrigerators and Freezers.—Consumption of commercial refrigerators and freezers closely approximates production, primarily because the large number of small shops manufacturing them do so on an order basis. Imports are negligible and have little effect on the total production and consumption.

Use of commercial refrigerators and freezers in 1958 was broken down approximately as follows (in percent):

Meat markets.....	20
Grocery stores.....	15
Restaurants and hotels.....	12
Soda fountains.....	20
Hospitals.....	6
Beverage cooling.....	12
Milk and dairy products.....	6
Industrial.....	2
Water cooling.....	5
Other types.....	2
	100

Imports

Because United States exports of air conditioning and commercial and industrial refrigeration equipment represent at least 90 percent of total imports, the United States export figures best approximate actual Mexican imports and will define the existing pattern more accurately than domestic import statistics.

Import duty rates on air conditioning and refrigeration equipment are as follows:

Tariff Number	Description	Specific duty pesos	Ad valorem duty percent	Official value pesos
718.01.07 ¹	Refrigerators of base metal, which burn liquid or gas fuel, weighing more than 200 kilograms. Per Legal Kilogram	0.60	60	none
718.06.01 ¹	Apparatus which forms a complete air conditioning unit comprising the cabinet, compressor, coil, fan, and air filter, weighing up to 1,500 kilograms. Per Gross Kilogram	0.40	40	28.00
718.06.03	Apparatus which forms a complete air conditioning unit comprising the cabinet, compressor, coil, fan, and air filter, weighing more than 1,500 kilograms, not including the ventilation shafts. Per Gross Kilogram	0.10	8	23.00
735.07.01 ¹	Electric refrigerators of base metal, weighing more than 200 kilograms. Per Legal Kilogram	0.60	70	19.50

¹ Goods in these classifications are subject to import control; the importer must obtain a permit from the Mexican Ministry of Commerce and Industry before placing firm orders for these goods.

The import duty is compound, i.e., a specific duty and an ad valorem duty are imposed. The ad valorem duty is levied on the invoice value or the official value, whichever is higher. An additional surtax of 3 percent of the total import duties is levied on all imports other than by mail; a 10 percent tax is levied on mail imports.

Exports

Exports of air conditioning and refrigeration equipment are negligible and are seldom reported in published export statistics.

Market Potential

United States exports of finished goods, particularly package air conditioners and commercial refrigerators, are virtually excluded now and for the future. The one present exception is the export of package air conditioning to border free zones and perimeters of the country. Nevertheless, the poor market for finished goods is offset by the growing market for basic air conditioning-ventilation and refrigeration units, components, assemblies, and parts necessary for the growing production of equipment. Total exports from the United States increased by \$1,500,000 between 1955-1957 despite greater restrictions on imports of finished goods and the increasing rate of manufacture. The manufacture of commercial refrigerators and freezers is growing, although it is somewhat stabilized at present.

Although the United States has a major share of the market, it may soon face competition in compressors, condensers, and other basic units. The principal mode of entry into the market will be on a price and terms basis. German compressors arriving in Mexican ports are priced at 50 percent of comparable United States units, and terms are up to 6 months from date of landing.

A common complaint by the trade is the failure of United States exporters to understand domestic business conditions and requirements. This is evident in the somewhat shoddy handling of orders by some firms, lack of care in packing and invoicing, lack of sincere interest in providing services and, very important, a reluctance to provide favorable terms on the purchase of equipment. The import tariff is structured in such a manner that perceptible and significant advantages are gained by paying

close attention to the classification of imports. The proper preparation of shipments, packing methods, documentation, and time of shipment can be crucial. The trade opinion is that the United States share of the market will be maintained only if exporters demonstrate a greater interest in selling, and, consequently, provide services to Mexican distributors comparable to those afforded their counterparts in the United States.

Investment and Licensing Opportunities

United States investors now have an opportunity to invest directly in manufacture or assembly of basic mechanisms. To some extent, such investment might be for the production-line manufacture of items presently produced on an "as-required" basis by installers or custom metalworking shops, such as sheet metal air-handling products, grills, diffusers, ice cans (molds) etc. However, compressor condenser units, purgers, balanced blower shafts, and similar items may also find a reasonably good market. Some of the equipment which might be produced by new investors could be utilized across the board by all installers of air conditioning and refrigeration equipment. Other products may be limited to the volume required by the sale of a given brand of equipment requiring parts and assemblies not interchangeable with other manufacturers' equipment.

The manufacturer would be wise to design and operate his plant to permit the manufacture of a wide variety of related products having essentially the same machinery and skills required by his basic product line. The market, at present, is probably not capable of absorbing the volume which a line plant could produce in a year.

Although local capital participation is not a requirement, a United States investor should carefully consider the possibility of local participation, including managerial.

Licensed manufacture in Mexico is both feasible and common. Generally, a United States firm will not license a contractor-installer and factory representative-distributor of air conditioning and refrigeration equipment to manufacture because contractors are reluctant to purchase products from firms which are also direct competitors in the sales and installation field.

Netherlands

Production

Production of air conditioning and refrigeration equipment in the Netherlands is relatively small. The total annual value of production, including parts, is estimated at between \$5.3–\$7.9 million for the last few years. Raw materials and power are adequate at present. The availability of labor has improved during the last two years because of a slight business recession. However, skilled labor is still rather difficult to obtain.

Laborers working in factories that produce air conditioning and refrigeration equipment are not classified separately in the wage statistics, but included in the general category of metal workers. Officially, wages differ according to the size of the cities and villages and to the measure of skill. The latest wage scales for metal workers in Amsterdam, Rotterdam, and The Hague amounted to \$0.53 per hour and \$25 per week for the trained workers; \$0.49 per hour and \$24 per week for the skilled workers; and \$0.46 per hour and \$23 per week for the unskilled workers. In medium-sized cities: Trained, \$0.50 per hour and \$24 per week; skilled, \$0.45 per hour and \$22 per week, and unskilled, \$0.43 per hour and \$20 per week. These figures do not include fringe and social insurance benefits, which may amount to as much as 40 percent of contract wages.

The refrigeration trade is well organized, being represented by six organizations of various kinds. The oldest, which has just celebrated its 50th anniversary, is the *Nederlandse Vereniging voor Koeltechniek* (Netherlands Association for Refrigeration Technique), 1 Pasteurstraat, Leiden. It is a scientific and technical association.

Air Conditioning Equipment.—Only one firm produces package air conditioners, but no information is available as to the quantity or the value of annual production. Five firms design, manufacture, and install complete air conditioning systems in ships and large buildings. Three other firms make certain parts for air conditioning equipment, and others make products related to air conditioning

construction. The component parts of air conditioning systems, except motors, are for the most part foreign, especially American. The total value of all air conditioning equipment produced is not known, but in view of the number of people employed in this industry, the value probably runs into several million guilders a year. (One guilder equals 26.3 U.S. cents.)

Refrigerating Equipment.—Some 14 firms reportedly manufacture or assemble refrigeration parts and equipment for industrial and commercial uses. No information is available as to the total value involved in these manufacturing and assembly activities, but it undoubtedly amounts to several million guilders annually. Only one firm reported that it produces commercial refrigerators. In addition, seven companies make display cases, walk-in and reach-in refrigerators for shop keepers, ice cream freezers, and similar equipment by special order. No information is available on total value of annual production of these products.

Channels of Distribution

Throughout the country are some 250 “refrigerated stores” and warehouses. Industrial air conditioning and refrigeration equipment assembled on the job is usually sold directly to the ultimate user, who often must meet special requirements. Ready-made commercial refrigerators are usually sold through local retail dealers. Commercial refrigerators made to order are sold through the local dealer, or directly to the final user.

Consumption

Estimating consumption is difficult. Some factories carry air conditioning or refrigeration equipment only as sidelines. Manufacturers making particular types of component parts or instruments sell these to other industries as well as to air conditioning or refrigeration industries. Parts made by other firms, foreign or domestic, are frequently used in production and assembly. Therefore, double counting may sometimes occur. Large single orders, such as the installation of equipment

in new ships, often cause consumption figures to fluctuate widely from year to year.

Total annual consumption of air conditioning and refrigeration equipment is rather substantial and may have been as much as \$9.2-\$11.8 million annually during the last few years, probably divided almost evenly between products of domestic and foreign origin. However, by sectors, consumption of products of foreign and domestic origin differs greatly. Commercial refrigerators sold are largely of domestic origin. Industrial air conditioning and refrigeration equipment are all produced or assembled locally, but the component parts are mostly foreign.

Information is not available on the number of units in use at present, but the consumption trend has been upward in the last few years for all air conditioning and refrigeration equipment. This trend is expected to continue because the populace is becoming more interested in refrigeration and air conditioning.

Because a defect in a refrigerator, if not repaired quickly, may cause considerable damage, adequate arrangements for servicing are an important sales factor. Therefore, repair shops are found all over the country. Five companies which are the subsidiaries of one prominent firm have established one company for the extension of service to all their customers.

Commercial refrigerators of 300 liters (1 liter = 0.35 cubic feet) retail at \$302; 440 liters at \$479; 570 liters at \$583, and 1100 liters at \$776.

The number of guilders earned by a Netherlands workman or employee is about the same as the number of dollars received by an American workman or employee. Obviously, because of the lower value of the guilder, the relation of prices to wages in the local market compares unfavorably with the relation of prices to wages in the American market.

Import Duties

All air conditioning and refrigerating equipment, except for complete refrigerators having an external volume not exceeding 2 cubic meters, is subject to a 6 percent ad valorem duty and an 8 percent sales

tax. Complete refrigerators of less than 2 cubic meter external volume are assessed a 12 percent ad valorem duty. Those up to and including 200 cubic decimeters have a sales tax of 21 percent. Those over 200 cubic decimeters are charged an 8 percent sales tax. Effective January 1, 1959, duties were reduced by 10 percent with respect to imports from the other EEC countries (France, West Germany, and Italy). These reductions were not extended to imports from the United States or other non-EEC countries. No import or export licenses are required.

Market Potential and Licensing Opportunities

Most imports are supplied by West Germany, followed by Great Britain. Although United States equipment is considered to be of excellent quality, in most instances it is more expensive than European equipment. As a result, little trade is carried on with the United States. American equipment must also overcome the difference in electric current characteristics: The United States uses 60 cycles, Europe, 50 cycles. Therefore, local firms must adapt American products to local requirements, especially on big projects. To meet this problem, some American manufacturers have licensed local manufacturers, or established branches or affiliates in Western Europe. This policy will likely be applied to a greater extent in the future, when European integration will result in the removing of import duties and create one market of some 170 million people.

Some domestic firms are interested in cooperating with American manufacturers in local production activities. Three manufacturers make large compressors for the refrigerating industry. However, small sealed compressors, are reportedly all imported, particularly from the United States, but also from Great Britain, West Germany, Sweden, and Denmark. Thus local manufacture of small sealed compressors may be profitable.

In the air conditioning and refrigeration field, American ideas are followed, American literature circulated, and American control instruments used.

Netherlands: Foreign Trade in Refrigerating Equipment, 1955-58

[Quantity in metric tons; value in thousand dollars]

Commodity and country	1955		1956		1957		1958	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Imports								
No. 839004—Refrigerating equipment for industrial and commercial use:								
United States.....	28	75	29	83	32	124	20	84
West Germany.....	207	303	260	418	201	438	1,026	1,779
Great Britain.....	322	501	204	398	169	337	155	296
Sweden.....	3	3	11	18	6	17	48	120
Other countries.....	20	58	100	154	103	166	59	133
Total.....	580	940	604	1,071	511	1,082	1,308	2,412
No. 839001—Commercial refrigerators:								
United States.....			3	5	39	69	43	70
West Germany.....	11	15	43	49	53	59	40	62
Great Britain.....	31	58	24	45	31	49	24	39
Other countries.....			10	12	13	17	13	20
Total.....	42	73	80	111	136	194	120	191
No. 839003—Ice-cream freezers:								
United States.....	1	3	1		9	60	7	34
Denmark.....	6	21	3	10	8	23	12	44
Italy.....	5	17	12	35	3	10	10	33
Great Britain.....	5	10	9	44	3	16	1	6
Other countries.....	11	35	13	9	7	19	19	42
Total.....	28	86	38	98	30	128	49	159
Exports								
No. 839004—Refrigerating equipment for industrial and commercial use:								
United States.....			3	25	6	78	11	133
West Germany.....	8	25	28	79	29	83	67	229
Turkey.....	28	23	38	44	11	24	158	222
Finland.....	16	15	3	4			104	147
Iraq.....	12	9	229	153	9	13		
Belgium-Luxembourg.....	79	117	95	167	68	99	102	137
Cyprus.....			21	19	18	17	79	67
Indonesia.....	45	63	272	262	115	111	53	47
Great Britain.....	11	18	11	18	7	89	6	48
Other countries.....	173	346	288	320	256	411	290	504
Total.....	372	616	988	1,091	519	925	870	1,534
No. 839001—Commercial refrigerators:								
Belgium-Luxembourg.....	9	15	2	5	11	17	23	32
Other countries.....	2	2	4	4	14	21	11	12
Total.....	11	17	6	9	25	38	34	44

Source: U.S. Embassy, The Hague.

Pakistan

Because Pakistan has a semitropical climate for the greater part of the year, air conditioning and refrigeration equipment are in strong demand. The Karachi district has the greatest demand because of its hot and excessively damp climate, its relatively heavy concentration of industries, and a purchasing power higher than in any other part of Pakistan. Further inland in West Pakistan the climate is hot and dry; the temperature fluctuates from 85°–110° during 7 months of the year. In East Pakistan, the climate is tropical, temperatures ranging from 90°–100° during 9 months of the year.

West Pakistan consumes more than 85 percent of total imports of refrigeration and air conditioning equipment. Demand is steadily rising, but stringent import licensing, due to balance of payments difficulties, severely curbs importation and consumption. The outlook for an increased volume of imports is not encouraging. No air conditioning and refrigerating equipment is exported.

Channels of Distribution

In West Pakistan, the Karachi area is the most important market for refrigerators and air conditioning equipment, because the people have a higher purchasing power, and industry is concentrated in this area. The next most important center is Lahore. In East Pakistan, Chittagong is an important distribution center.

Only two firms are importers and distributors. The others, numbering about 40, usually combine the functions of agent, importer, retailer and installer of refrigerators and air conditioners. They usually obtain import licenses for small amounts of air conditioners and refrigerators.

Consumption

Air conditioning and refrigeration equipment are not manufactured or assembled locally. Therefore, consumption about equals imports. At least two firms are reported to have obtained the sanction of the Government to assemble refrigerators and window-type air conditioners. However, despite reported sizable investments in land and buildings,

neither firm has started assembly operations because the Government has not yet granted the requisite import licenses for machinery and component parts. In fact, the Government of Pakistan is not likely to grant an import license for assembling equipment in the near future. Imports, which consist mainly of household refrigerators and window-type air conditioners, probably represent only one-fourth of actual demand. Restaurants, hotels, and drug stores are presently the major consumers of refrigerators and window-type air conditioners. Most air conditioners and refrigerators operate on 220/230 volts A.C. 50 or 60 cycles. Local air conditioning dealers have noted a marked preference for the air-cooled package system in the Karachi area because of the water shortage, and the high cost of installation of the water-cooled system. In up-country areas, air conditioning by water-cooling system is preferred.

Because the import of parts is restricted, most household refrigerators and window-type air conditioners are imported. To a lesser extent, room air conditioners, package type, and central system (air or water cooled) are also imported. However, a number of industries are planning to install commercial refrigeration and equipment, and demand for central and package-type air conditioning by class A cinema houses, hotels, textile factories, laboratories, hospitals, research institutions, and some banks is steadily increasing. In such instances, the Government of Pakistan grants an import license to the end-user, but due to limited foreign exchange availabilities such licenses are not freely given. The Government will probably place even more stringent curbs on imports of air conditioning equipment. However, certain essential industries requiring such equipment stand a better chance of obtaining their requirements.

Existing cold-storage facilities are extremely inadequate for the country's requirements. According to Government estimates in 1955, there were then about 30 cold storage plants, having a total capacity of 11,000 tons in West Pakistan and 2, having a capacity of 1,600 tons, in East Pakistan.

However, current trade estimates indicate the existence of about 60-80 cold-storage installations.

In the 5-year plan, the Government has emphasized the need for additional cold storage warehouses—to be constructed at Dacca, Sukkur, Santahar, Chittagong, Hyderabad, Bahawalpur, Multan, Jannaharabad, Leiah and Mardan. In December 1958, the Government also stated that agricultural projects would now be given high priority and that it was considering the establishment of a chain of cold storage plants to preserve food commodities such as fish, vegetables, potato seed, and fruit. The 5-year plan also mentioned the necessity for installing dehumidification and ventilation plants for the textile industry. Only about 50 percent of the industry is so equipped.

The International Cooperation Administration (ICA) grants commodity assistance. Although no air conditioners may be imported for private use, under such assistance programs a number of industries, laboratories, and research institutions have been able to import air conditioning equipment. Similarly, a number of hotels, restaurants, Government-operated fish stalls, and sweetmeat establishments have imported commercial refrigerators (display cases) under the ICA Program.

The Government is becoming a major consumer of air conditioning equipment. Various departments and institutions run by the Government, such as post and telegraphs, laboratories, hospitals, and radio stations, are becoming important users of air conditioning equipment, utilizing mainly package and central air conditioning systems. During a recent 6-month period, installation of air conditioning equipment by Government departments reportedly exceeded \$150,000. Another major consumer of heavy air conditioning equipment is the Industrial Development Corp., whose industrial plants are in various stages of completion.

In addition to the cold storage plants, about 150 ice plants, mostly small, are also located in West Pakistan. Trade estimates show about 7,000 air conditioners (almost entirely window-type), 100-200 package-type air conditioners, and 100 commercial refrigerators (mostly display cases) in use in the country. The railways are reported to possess about 500 refrigerated freight cars. No estimates are available on other types of air conditioning and refrigeration equipment, but they are believed to exist in only negligible quantities.

Because of wide fluctuations in voltages and high humidity, refrigeration and air conditioning equipment breaks down frequently. Service facilities are

poor but are nevertheless improving. Difficulties in obtaining spares largely account for the lack of proper service facilities. Only two firms, representing heavy air conditioning equipment companies, have adequate and well-staffed workshops and service facilities.

Because the country is under martial law, most traders have been reluctant to submit retail price lists, asserting that they have no stocks of refrigerators or air conditioners or that they are under clearance. However, retail prices of United States air conditioners at Karachi as of January 8, 1959, were as follows, including step-down transformer where required:

<i>Horsepower capacity</i>	<i>Retail price range</i>
1.....	\$409-\$525
1½.....	378- 683
2.....	504- 683

The cost and freight range was as follows:

<i>Horsepower capacity</i>	<i>Cost and freight range</i>
¾.....	\$240
1.....	185-\$311
1½.....	223- 250
2.....	311
3.....	751- 863
20.....	3,946

Government-controlled selling prices of air conditioners during the calendar year 1957 were as follows:

<i>Country of origin</i>	<i>Horsepower capacity</i>	<i>Selling price range</i>
United States.....	¾	\$415
Germany.....	¾	428
United States.....	1	365-\$430
Germany.....	1	470
United States.....	1½	441-519
Germany.....	1½	826-868
United States.....	2	603-652
United Kingdom.....	2	633

The basis of price control in 1957 was to allow 40-45 percent of the landed cost as profit margin.

After price controls were lifted early in 1958, and before martial law was imposed, an air conditioner of 1 hp, 230 volts, would sell for \$735-\$840. Recent Martial Law Regulation No. 42 states that the retail price of refrigerators and air conditioners should not exceed 133⅓ percent of the landed cost, plus 5 percent for warranty, but it also requires that the retailer obtain at least 15 percent of such landed cost, within the above margin.

Low price quotations influence demand; undoubtedly, quality is considered, but frequently competitive prices are a bigger attraction. Neverthe-

less, American manufactured equipment is usually preferred, and, to a lesser extent, United Kingdom equipment.

Imports

Imports of refrigeration machinery (including air conditioners) in fiscal years 1952 and 1953 were as follows, according to the Government: Fiscal year 1952, \$644,000; fiscal year 1953, \$457,000. Imports of refrigeration machinery in 1953 came mainly from the United States—85 percent—and the United Kingdom—10 percent. Nongovernmental imports of refrigeration machinery from Germany in 1957 amounted to \$1,139,932, far more than imports from the United States (\$244,024) and United Kingdom (\$68,203), the traditional suppliers in the past. However, this is not an indication of future trends in imports because the trade attributes the increase to one or two large industrial contracts.

Nongovernmental imports of refrigeration machinery and air conditioners (except for about 500 air conditioners, mostly window-type imported as personal baggage) were as follows in calendar years 1956 and 1957:

<i>Country of Origin</i>	<i>1956</i>	<i>1957</i>
Belgium.....	-----	\$371
West Germany.....	\$1,123	1,139,932
India.....	84	-----
Japan.....	-----	-----
Canada.....	-----	358
Portugal.....	-----	332
Lebanon.....	-----	622
Sweden.....	811	10,801
Switzerland.....	3,913	-----
United Kingdom.....	54,822	68,203
United States.....	105,519	244,024
	166,272	1,464,643

The Government announces its import policy every 6 months and issues import licenses automatically to registered importers—up to a certain percentage of their established ceiling. Occasionally, the Government issues import licenses to sole agents of well-known foreign brands. Also, it grants import licenses directly to essential industrial consumers, who may import direct, or through the existing importers or agents. Imports by Government departments are usually made through local agents of foreign manufacturers, on the basis of bids. As a rule, no import licenses are issued specifically for air conditioners, but the Government does mention on the licenses for import of refrigerators that a certain percentage should be utilized for import of window-type air conditioning.

Import duties on air conditioning and refrigeration equipment requiring at least one-quarter of one brake-horse power are 10 percent ad valorem; on equipment requiring less than one-quarter of one brake-horse power (except cabinet-type refrigerators), 30 percent ad valorem. All items are subject to a 20 percent sales tax. Machinery and parts not otherwise specified (including all types of air conditioning and refrigerating machinery and apparatus) may appear on the list of importable items. All commercial imports are subject to import license, granted at the discretion of the licensing authorities.

Because import licenses are granted for small amounts, most importers endeavor to import as many refrigerators and air conditioners as they possibly can. Therefore, only household refrigerators and window-type air conditioners are being imported, whereas the other types, such as reach-in and walk-in varieties, are not. Because import licenses are valid for all countries of the world, the license holder imports from whatever source he desires.

Market Potential

United States equipment has earned a good reputation. Most of the better-known American manufacturers are adequately represented. An estimated 95 percent of the window-type air conditioning equipment imported is of United States origin. The possibility of expanding exports from the United States is primarily dependent upon the foreign exchange position of Pakistan. Although the Government may curb imports for household consumers, it will probably provide foreign exchange in imports for industries, within the limitation imposed by the country's balance of payments position and foreign exchange made available by the International Cooperation Administration.

Because import licenses are valid in all countries of the world, including the dollar area, except for some single-country licenses resulting from bilateral trade agreements, American firms can effect sales from any country through subsidiaries or licensees. In fact, some refrigerators from the United Kingdom, France, and Germany, manufactured by a United States subsidiary, are presently being imported.

Investment Opportunities

One large American manufacturer of automobiles, refrigerators, and air conditioners made a survey on the possibility of manufacturing such items in Pakistan. The survey revealed that the overall

local demand did not justify the manufacture of refrigerators and air conditioners. Of the two firms in Karachi allowed to assemble refrigerators, one has a licensing arrangement with an American manufacturer.

At present, most components of refrigeration and air conditioning equipment have to be imported; no domestic manufactures of electric motor compressor units exist as yet. The Government, in considering investment in industry, gives first priority to industries independent of foreign imports. Those industries that have had to depend on imported raw materials or parts for assembly have been working

well below their actual capacity because import licenses have been issued only in limited quantities.

Government regulations usually require local capital participation in foreign investments. But the Government is unwilling to grant full import licenses to any industry dependent on imports, even though it may give permission to set up the industry. Some members of the trade feel that because the Government is not happy with the radio assembly industry (locally assembled radios cost almost as much as the imported ones), the new Government will probably not favor assembly of refrigeration and air conditioning equipment.

Union of South Africa

Production

Air conditioning and industrial refrigeration installations are located throughout the country. However, the coastal cities, particularly Durban because of its warm climate, provide the principal market for air conditioning of buildings. The firm which does more air conditioning than all other firms combined has its main office in Durban, but it does much of its work from its Johannesburg office. The mines account for a substantial but sporadic volume of air conditioning contracts, valued at \$56,000–\$560,000 a year, the average being estimated at \$112,000. Suppliers for the mines and all the large air conditioning contractors except the Durban firm are located in Johannesburg, considered the principal air conditioning producing area.

Industrial refrigeration contractors operate on a countrywide basis, most of the large ones being located in Johannesburg. However, a substantial market for refrigeration in precooling sheds exists in the Cape Province, which is the center of the fruit and fishing industries. The small commercial cabinet manufacturers are concentrated in Durban and Johannesburg. Probably the largest commercial refrigerator production is in Durban.

Few firms specialize in the manufacture of air conditioning or refrigeration equipment. Installations are usually handled by separate departments in the large engineering firms, except for the largest air conditioning contractor and a few others who do their own installing. The commercial refrigerator manufacturers are all very small. They do not mass-produce, but usually manufacture to the customer's specifications, often handling sidelines.

This diversification is necessitated by the limited size of the local market. Commercial refrigerator manufacturers feel that mass-production methods are usually impractical in such a small market. In fact, one firm manufacturing an American refrigerator under license was reportedly forced out of business because it tried to mass-produce, only to find the market for its product saturated.

Raw materials and power are readily available.

Manufacturers who employ a permanent working force have few labor problems, but air conditioning and refrigeration equipment contractors complain of a slight shortage of skilled labor. Especially scarce are sheet metal workers, pipefitters, electrical mechanics, refrigeration mechanics, and engineers.

One company is a subsidiary of an American firm. One producer of copper tubing, Stewarts and Lloyds of South Africa, Ltd. is a subsidiary of Stewarts and Lloyds of Birmingham, England. A large air conditioning contractor, Thermotank (South Africa) (Pty.) Ltd., is a subsidiary of Thermotank of Glasgow, Scotland. In addition to this direct foreign capital investment, many contractors represent foreign firms.

No Government subsidies are available.

Wages for skilled labor, performed only by Europeans (the designation for the white population), run slightly higher for air conditioning and refrigeration contractors than for the commercial refrigerator manufacturers who employ a permanent labor force. Journeymen installing air conditioning and refrigeration plants earn an average of approximately \$1.20 an hour, which includes the customary cost-of-living allowance. Each European skilled worker traditionally has one and sometimes two native assistants who carry his tools and perform the more menial tasks. These helpers earn approximately 22 cents an hour, bringing the true cost of skilled labor to between \$1.40–\$1.60 an hour. Hourly wages of skilled factory workers amount to slightly more than \$1.00; semi-skilled wages run between 50–75 cents; women earn about 50 cents; and non-European unskilled factory workers earn between 25–50 cents.

Unitary Air Conditioners.—Production of package air conditioners is negligible. One firm in Johannesburg makes 3–4 units a month (3 hp. and over) to the customer's design. Another firm has been making about 100 package units a year in its Durban plant, but has recently decided to discontinue production. Local trade sources consider the market too small for any important production.

Central Plant Air Conditioning Equipment.—Local production of air conditioning systems is difficult to

estimate. The systems consist of both locally manufactured and imported parts, and are installed by contractors, most of whom represent overseas firms. Compressors and controls must be imported. Other parts, such as coils (evaporators), condensers, and tubing, are either imported or purchased from one of several domestic manufacturers. Ductwork is done by the local contractors. According to trade sources, the value of imported parts may represent anywhere from 25-90 percent of the cost of the complete system, depending on the nature of the job.

In fiscal year 1955, the value of articles manufactured and work done in the central air conditioning field was \$1,380,000. This figure was regarded by most trade sources as too low. On the basis of figures furnished by all of the major air conditioning firms on the value of contracts handled by them during the most recent 12-month period, the total annual value of air conditioning contracts is about \$3,775,000. However, inasmuch as many of the air conditioning jobs are one-time contracts, such as in mines and large buildings, this figure will vary widely.

Refrigeration Equipment.—The industrial refrigeration industry is conducted very much like the air conditioning industry. Installations are handled by contractors, most of whom have overseas connections. Controls and compressors are imported, although some compressor bed plates are made locally. Tubing, coils, and condensers are either made locally or imported.

According to Government statistics, the value of articles manufactured and work done in fiscal year 1955 was \$263,000, a figure considered far too low by local business sources. The Consulate General's estimate of the value of industrial refrigeration contracts approximates \$1,958,000 a year. However, because many of the contracts are large one-time installations, such as fruit cooling sheds for the docks at Cape Town, the estimate is subject to wide variations.

Commercial Refrigerators.—Cabinets for commercial refrigerators are made locally by a number of small firms. Compressors and controls are imported; condensers, coils, and copper tubing are imported or obtained locally. These parts are assembled in the completed unit by the cabinet manufacturers. According to official statistics, commercial refrigerators manufactured in fiscal year 1955 were valued at \$845,000. Trade sources estimate the value of 1958 annual output at \$1,260,000-\$1,400,000, representing a volume of 3,000 refrigerators.

Parts.—Licenses must be obtained for imported parts, but contractors and manufacturers have little difficulty obtaining the necessary permits. Coils and condensers are manufactured locally by five firms. Air-cooled condensers are not used extensively; most of the local condenser production is of the water-cooled type. The estimated annual value of air-cooled condenser output is \$16,800; water-cooled condensers, \$123,300; and coils (evaporators), \$560,000. Copper tubing for refrigeration and air conditioning is produced locally by two firms. Total annual production of copper tubing amounts to about 2,000 tons, of which only 2-3 percent is reportedly used in refrigeration and air conditioning.

Channels of Distribution

The principal distribution center for air conditioning and refrigeration equipment is Johannesburg. Other major centers are Durban, Cape Town, and Port Elizabeth. Five large wholesalers supply the trade. These firms import directly and sell to the contractors or, in the case of commercial refrigerators, to the cabinet manufacturers. Many contractors also act as stocklist-distributors for their overseas principals. Room air conditioners are not usually sold in retail outlets, but through the contractors or dealers who make the installation.

No fixed channels of distribution are used by the manufacturers of commercial refrigeration cabinets. Most firms sell the completed product direct to the end-user. Two firms sell at the retail level, as well as to wholesalers—in many instances to the same ones who supplied them with essential parts.

Consumption

Accurate consumption data for air conditioning and refrigeration plants are not available. Estimates may be derived from value-of-contract figures. Accurate consumption figures for commercial refrigerators are not available, but the value is estimated to be between \$1,540,000-\$1,680,000 a year.

Consumption of package air conditioners is very low. All units are imported; almost none are manufactured locally. Inasmuch as almost all package air conditioners come from the United States, statistics on United States exports may be used as a reliable measure of consumption. These data show 2,356 units valued at \$679,918 exported in 1957. Trade sources confirm that consumption is probably not more than 2,500 units a year. Package air conditioners, usually $\frac{3}{4}$ or 1 hp., are used chiefly in

executives' offices and in hotels and restaurants. The air conditioning of homes is not yet being undertaken.

Central air conditioning systems are installed primarily in office buildings, hospitals, department stores, and industrial plants where temperature and humidity control is necessary and desirable. Air conditioning contractors also supply the mines, but frequently such installations are large ventilating and cooling jobs and do not constitute air conditioning systems as such. Several mines are beginning to use stope coolers extensively. Stope coolers are complete mobile air conditioning units which can be wheeled right up to the place where the miner is working. These units are supplied almost exclusively by the agents of three large American firms.

Industrial refrigeration is used in fruit precooling sheds, wine storage houses, metal processing plants, hotels, confectionary plants, abattoirs, and meat-packing plants. Refrigeration installations are in some demand by firms which quick-freeze and transport fish, lobster, vegetables, and fruit, but this industry is still in its infancy. Commercial refrigerators are used primarily in butcher shops, grocery stores, tea rooms, and hotels. Only a few supermarkets exist so far, but supermarket merchandising is expected to expand.

Homeowners do not yet appear ready to go to the expense of installing room air conditioners. They can probably be educated over a period of time to the benefits of air conditioning, but prospects for a sudden upsurge in the home market are not very bright. For example, Johannesburg, the country's largest city, has a moderate climate. Therefore, the attitude prevails that neither air conditioning nor central heating is worth the investment. The non-Europeans, comprising more than 11 million of the country's 14 million inhabitants, are not potential home air conditioning purchasers because their income is too low.

The best potential market for package units appears to be in hotels and restaurants and in executives' offices in older buildings which do not have central heating systems. Although limited, this market will probably grow steadily as businessmen begin to appreciate the benefits of air conditioning, not only in controlling temperature, but in eliminating dust and noise, which are particularly prevalent in Johannesburg and some other cities. The bulky early-model package air conditioning units are preferred, but models of smaller dimensions are gaining favor.

Only about 5 percent of the business establishments in Johannesburg have any type of air conditioning or air cooling and filtration system, and about 25 percent of establishments in the coastal towns where the climate is much more humid. Many systems were installed on the cheapest possible basis and were poorly engineered. As a result, central air conditioning earned a poor reputation which is only now beginning to be overcome.

The future for central systems appears fairly promising. In Durban, few new buildings are being built without central air conditioning, and some existing buildings are being equipped. Many department stores have central systems and are setting the pace for other types of businesses. Plans are reportedly underway in Cape Town to install central air conditioning in two large office buildings soon to be erected, and the demand for central systems in that area should increase steadily. Demand is also expected to grow in Johannesburg.

The volume of air conditioning systems installed has until recently been closely tied in with the building programs. However, the postwar building boom has subsided, as has the country's general economic growth rate. The latest official statistics show 17,110 nonresidential building plans approved from January to October 1958, compared with 17,434 for 1957. Thus, although the air conditioning market will probably expand, it will depend increasingly on recognition of the benefits to be derived, rather than on any sudden upsurge in construction. Consumption of systems and other types should increase about 10 percent a year.

The expansion of the market for industrial refrigeration depends on the country's progress in introducing new food-handling techniques. For example, locker plants for public rental might well find acceptance in a number of cities. This would mean, according to business sources, a contract of at least \$42,000 per plant, of which about \$16,800 would be for refrigeration.

Another relatively untouched field is refrigerated transport. Most of the vegetables supplied to Johannesburg and vicinity come from the Eastern Transvaal farm areas, about 230 miles distant. The South African Railway has discontinued its former overnight service from this area, leaving an excellent opening for the use of refrigerated transport to keep the produce fresh until delivered.

A quick-freeze industry would also appear to have good prospects, particularly in view of the great distances between urban areas. A few small farms in the Cape already do quick-freezing, but the out-

put is estimated at only 500 tons per year and the products are not always of the finest quality. Although most European families still have servants, native labor is rapidly becoming scarce, and trade sources think that the country is ready to accept frozen foods. Transportation is a big problem, and quick-freezing would eliminate the hauling of waste. In addition to the local market, a considerable export market, particularly to West Africa and the Rhodesias, might be developed for frozen foods.

Most observers believe that improvements in food-handling practices will increase, spurred by public demand. Consumption of refrigeration equipment would consequently increase at a rapid rate. The consumption trend of commercial refrigerators is largely allied to the introduction of modern food-handling methods by markets, restaurants, and hotels. This market is expanding, in any event, apace with economic developments and the rise in purchasing power. Future consumption of all refrigeration equipment could increase 10 percent or more per year.

Service facilities for air conditioning and industrial refrigeration equipment are handled by the contractor, and servicing of commercial refrigerators is usually done by the manufacturer. According to end-users, service facilities are sometimes unsatisfactory. Stocks of spares are often inadequate. Many firms are interested only in doing the most possible initial business, and neglect to provide a proper service follow-through. However, now that competition is increasing, servicing should improve.

Trade sources report that a one-ton room air conditioner costs about \$280 landed and will sell for approximately \$375. The cost of a central air conditioning or industrial refrigeration system varies according to the nature of the job. Refrigeration compressor costs, including installation, range from \$2,800 for 10 hp to \$112,000 for 500 hp. In the commercial field, locally made display cases of a standard size might sell for \$700-\$840 compared with \$840-\$1,260 for the imported product. The same prices usually hold whether the refrigerator is sold by the manufacturer or the wholesaler.

Price undoubtedly is the most important factor influencing the market. Competition is intense, and quality and design are often sacrificed in favor of the cheapest price. This attitude may change gradually as end-users come to appreciate the benefits of good engineering, but United States firms exporting to the local market now should be extremely careful about their pricing policies.

Imports

Statistics do not show imports of package air conditioners as a separate category, but imports are estimated at about 2,500 package units per year. No figures are available on imports of other types of air conditioning systems or of refrigeration equipment for industrial and commercial uses. Commercial refrigerators are included in the general import figures on domestic refrigerators and cannot be broken out, but trade sources state that imports of commercial refrigerators as such, excluding ice cream cabinets, are negligible.

Air conditioning equipment imported from the United Kingdom is not subject to import duties. However, imports from the United States and other countries not having trade agreements are subject to a 5 percent import duty. Refrigerating machinery that is mechanically or chemically cooled and household refrigerators of 4-12 cubic feet capacity are assessed a 15 percent charge, as are also parts. Other refrigerating machinery is free of any import duty charge.

Exports

No official export statistics are available. However, it is doubtful if any substantial exports have been made of air conditioning and refrigeration equipment and parts, except to the Rhodesias, where several of the local contractors have branches. Exports of commercial refrigerators and domestic refrigerators combined amounted to 2,796 units in 1957, of which 2,534 went to the Rhodesias. No separate figures are available for commercial refrigerators.

Market Potential

Almost all imports of package air conditioners presently come from the United States. However, according to industry sources, some German and Italian manufacturers have recently come into the market on a price basis. United States products are not likely to continue dominating this market, and, in fact, will have to be priced carefully to meet the competition. If prices are competitive, United States imports should increase in volume, although their proportionate share of the market will probably drop.

The trend toward local manufacture of parts for central air conditioning and industrial refrigeration systems is increasing, and trade sources report that domestic condensers and coils, although in some instances not as good as imported products, offer a

considerable price advantage. Therefore, imports should continue to drop as domestic manufacture increases. United States compressors and controls should continue to sell well. American equipment seems to be high priced, and may lose ground to the European products, but with some care in pricing, United States sales should increase.

As the local commercial refrigerator industry expands, imports can be expected to drop, particularly because a 15-percent duty was recently assessed. A good market will still be available for imported components, at competitive prices, but imports of the completed unit will probably not be able to compete with the local product.

Although continued sales from the United States are feasible, selling through third-country licensees would seem to offer one solution to the problem of meeting price competition. Such arrangements have in fact already been made by several American firms in the industry, resulting in satisfactory sales from European licensees.

Investment Opportunities

Direct United States investment has traditionally been encouraged by the South African Government. The key factor favoring such activity is the benefits which can be derived from proximity to the local market. The present market for package air conditioners is much too small to warrant a sizable investment for their exclusive production. Many American manufacturers are already adequately represented by local contractors in the central air conditioning and industrial refrigeration markets. These markets are still relatively small, and competition is keen; in fact, one large engineering firm has already stopped production for this reason. Possibilities may exist for the local production of compressors and other parts.

The commercial refrigerator market appears to be much too small to warrant direct investment in this field alone. The situation could change. However, at present, even the small commercial refrigerator manufacturers find that they must go into other lines to make ends meet.

Licensing Arrangements

Making licensing arrangements with local firms seems to be one way of gaining access to a limited price-conscious market without a sizable capital investment, which would take a long time to write off. Business sources believe that technical knowledge is more in demand than capital. Some equipment is already manufactured under license from United States firms. Two Cape Town firms are presently negotiating for the rights to manufacture refrigeration parts under license, and one Johannesburg firm contemplates similar arrangements. A Johannesburg commercial refrigerator manufacturer, and several Durban firms, are also interested in licensing arrangements.

Union of South Africa: Value of Imports of Air Conditioning and Refrigerating Equipment, 1954-56

[Dollars]

Commodity and country of origin	1954	1955	1956
No. 366 (4)—All refrigerating machinery:			
United States.....	595,918	209,406	634,906
United Kingdom.....	330,558	225,698	568,839
Other.....	41,489	33,493	237,035
Total.....	967,965	468,597	1,440,780
No. 366 (5)—All air-conditioning machinery plus ventilating fans:			
United States.....	373,733	396,737	679,422
United Kingdom.....	554,539	512,051	782,534
Other.....	57,451	175,739	117,804
Total.....	985,723	1,084,527	1,579,760

Source: Import statistics of the Union of South Africa.

United Kingdom

Production

Commercial, industrial, and marine air conditioning and refrigeration equipment and machinery has been manufactured in significant quantities in the United Kingdom for a number of years. In fact, one leading British maker claims that 68 percent of the world's refrigerated cargo equipment was manufactured in its works.

The latest available official statistics on the production of air conditioning equipment reflect the slowly growing market for these products, the value of which totaled \$54,782,000 in the 1954 census of production. Unit heaters and heater batteries accounted for \$4,608,800; air filters, washers, and scrubbers, \$4,312,000; plenum systems, \$6,263,600; ventilation hoods, ducts, cowls, etc., \$22,506,400; space heating plants and appliances, \$5,787,600; and "other" equipment in this category, apart from boilers, radiators, and the like, \$11,303,600.

According to official statistics, production of refrigerators and refrigeration equipment has increased in value progressively from \$90,725,600 in 1954 to \$96,219,200 in 1957, and \$123,244,800 in 1958, the latter including \$38,774,400 for commercial and \$15,489,600 for industrial refrigeration machinery.

Air conditioning manufacturing plants are located throughout the country, no one region being particularly important as a manufacturing center. Leading areas for the manufacture of refrigerators and refrigeration machinery include Luton, Dartford, Glasgow, Cowley (Oxon.), Dundee, Rugby, Liverpool, and Bromborough.

The production of commercial and industrial air conditioning equipment is partly an assembly operation using motors brought in from other companies; the fans, ductwork, and the like are manufactured locally. Refrigerator production is similar, except that one or two of the larger electrical equipment firms manufacture complete equipment.

Raw materials and parts are freely available. Steel sheet is readily available from up-to-date rolling mills, and electric motors and condensing units from local manufacturers. The country has a

small overall surplus of labor but in certain areas, the southeast for example, skilled or semiskilled workers are scarce. In Scotland, unemployment is well above the national average, and pockets of unemployment exist in a number of other industrial areas.

According to 1958 statistics for manufacturing industries, men over 21 worked an average of 47 hours a week and earned \$35.93 a week. Average hourly earnings in the engineering and electrical goods manufacturing trades for men were about \$0.79; for women, \$0.49; boys under 21, \$0.34; and girls under 18, \$0.30.

Foreign capital has participated in the development of the air conditioning and refrigeration industry in the United Kingdom. One of the leading makers of domestic refrigerators is a subsidiary of a Stockholm concern. American finance and know-how is also well represented, notably by two major companies in industrial and commercial refrigerators, and two in domestic refrigerators. Foreign investment in air conditioning is not so prevalent, although several important British companies originally had either manufacturing arrangements or some financial links with American concerns.

Channels of Distribution

Package air conditioners are usually marketed direct by the manufacturers to building and electrical contracting firms, and advertising is largely directed to architects, contractors, and others concerned with the development of commercial properties. Adequate staff, equipment, and premises for servicing are usually a manufacturer's requirement for appointment as an authorized dealer.

Consumption

For climatic reasons, domestic air conditioning equipment is still a rarity. The potential market is undoubtedly greater for refrigerators than for air conditioning units, the latter being more dependent upon "hard sell" and surplus purchasing power of the middle and higher income groups. Package air

conditioner sales are almost wholly to industrial or commercial users.

Electrical and gas domestic air conditioning machines and refrigerators are charged a purchase tax of 25 percent of the wholesale value; and other domestic equipment of this kind, 12½ percent. The tax applies to imports as well as domestic goods.

Imports

Imports of air conditioning and refrigeration equipment totaled \$1,974,000 in value in 1958. These were mostly commercial and industrial refrigerators or refrigeration machinery, and the chief suppliers were the United States, Denmark, West Germany, and Sweden.

“Air conditioning units, self contained, incorporating a motor-driven fan, etc.” and refrigeration equipment are dutiable at 15 percent ad valorem, and parts and electric space heating at 20 percent. In all these groups, products qualifying for Commonwealth Preference enter free of duty. The rates are based upon those shown in the new June 26, 1959, Customs Tariff and are given as a guide to the probable rate of duty for equipment in the categories broadly defined above. A sales tax, known locally as a purchase tax and applying to imports as well as domestic goods, is chargeable on the wholesale value of a number of products; for air conditioning units and refrigerators, the rate is

currently 25 percent; for other domestic equipment of this kind, 12½ percent.

Import licenses and exchange permits are required for imports from the United States, although electric domestic machines and parts were liberalized on June 8, 1959, and may now be shipped freely.

Exports

Exports amounted to \$15,884,120 in 1958, distributed as follows:

Type of Equipment	Amount
Air conditioning machines, self contained.....	\$766,920
Refrigerators and refrigeration equipment:	
Commercial, complete.....	3,268,160
Commercial, parts.....	7,642,600
Industrial.....	4,206,440

Market Potential

After the outbreak of World War II, domestic restrictions were for some years imposed which precluded, except under license, the import of a large number of products, particularly from dollar sources. While such restrictions were in force, the outlook for the development of a market for American-manufactured equipment was unfavorable. The recent lifting of restrictions on a number of imports cannot but improve the outlook for American manufacturers. Imported goods are of course under competitive conditions; quality, design, and price are important factors.

United Kingdom: Exports of Air-conditioning and Refrigerating Equipment, 1954-58¹

Commodity and country of destination	1954			1955			1956		
	Units	Metric tons	Dollars	Units	Metric tons	Dollars	Units	Metric tons	Dollars
No. 1a—Complete air-conditioning machines, self-contained, comprising elements for cooling, control of humidity, cleaning and circulating of air:									
Commonwealth and Irish Republic.....	969	284	553,358	953	114	363,891	789	86	315,311
Other countries.....	250	53	125,480	132	39	94,376	159	22	71,291
Total.....	1,219	337	678,838	1,085	153	458,267	948	108	386,602
No. 1b—Parts for air-conditioning machines, self-contained, comprising elements for cooling, control of humidity, cleaning and circulating of air:									
Commonwealth and Irish Republic.....		561	858,203		95	223,784		28	139,034
United States.....		2	7,633		2	5,256		1	1,408
Other countries.....		196	850,570		89	221,967		23	85,624
Total.....		759	1,716,406		186	451,007		52	226,066
No. 2—Automatic power-operated refrigerators (complete, of a storage capacity exceeding 12 cubic feet, and complete mechanical units therefor):									
Commonwealth and Irish Republic.....	2,793	593	865,701	3,665	588	853,202	3,003	571	834,263
Other countries.....	4,552	772	1,044,487	4,654	680	1,000,034	5,873	709	996,595
Total.....	7,345	1,365	1,910,188	8,319	1,268	1,853,236	8,876	1,280	1,830,858
No. 3—Parts for automatic power-operated refrigerators (No. 2):									
Commonwealth and Irish Republic.....		3,840	7,002,198		3,399	7,027,700		3,670	7,544,211
Other countries.....		4,437	8,358,090		3,091	5,781,140		3,380	6,911,122
Total.....		8,277	15,360,288		6,490	12,808,840		7,050	14,455,333

United Kingdom: Exports of Air-conditioning and Refrigerating Equipment, 1954-58¹—Continued

Commodity and country of destination	1954			1955			1956		
	Units	Metric tons	Dollars	Units	Metric tons	Dollars	Units	Metric tons	Dollars
No. 4—Automatic heat-operated refrigerators (complete, of a storage capacity exceeding 12 cubic feet, and complete mechanical units therefor):									
Commonwealth and Irish Republic.....	296	41	58,330	507	64	81,326	265	36	48,826
Other countries.....	488	84	117,871	125	14	20,902	163	20	28,857
Total.....	784	125	176,201	632	78	102,228	428	56	77,683
No. 5—Parts for automatic heat-operated refrigerators (No. 4):									
Commonwealth and Irish Republic.....		504	725,990		188	400,996		103	236,020
United States.....		2	2,982		4	2,848		6	6,572
Other countries.....		499	982,836		132	285,888		62	141,022
Total.....		1,005	1,711,808		324	689,732		171	383,614
No. 6—Nonautomatic refrigerating machinery, including parts:									
Commonwealth and Irish Republic.....		862	1,051,518		1,413	1,861,482		2,068	2,719,220
Other countries.....		490	666,766		1,522	1,928,164		2,456	2,991,274
Total.....		1,352	1,718,284		2,935	3,789,646		4,524	5,710,494

¹ For 1957 and 1958 air-conditioning and refrigerating machinery and fans were basketed in category No. 7. Exports of air-conditioning machines (7a) totaled 402 metric tons valued at \$1,198,660 in 1957 and 228 metric tons valued at \$767,007 in 1958; exports of refrigerators and refrigerating equipment, including commercial refrigerators, complete and parts, and industrial plant and equipment (7b) totaled 13,277 metric tons valued at \$24,138,789 in 1957 and 8,565 metric tons valued at \$15,117,544 in 1958.

Source: *Annual Statement of The Trade of the United Kingdom with Commonwealth Countries and Foreign Countries, 1956 Compared with the Years 1953-1955*. Volume III, HMSO, London; *Accounts Relating to Trade and Navigation of the United Kingdom*. Board of Trade, London, December 1958. (For the years 1957-1958.)

United Kingdom: Reexports of Air-conditioning and Refrigerating Equipment, 1955-57

Commodity and country of destination	1955			1956			1957		
	Units	Metric tons	Dollars	Units	Metric tons	Dollars	Units	Metric tons	Dollars
No. 1—Air-conditioning machines, self-contained, comprising elements for cooling, control of humidity, cleaning and circulating of air, complete:									
Commonwealth and Irish Republic.....	6		2,226				2		
Other countries.....	1	1	283						1,056
Total.....	7	1	2,509				2		1,056
No. 2a—Refrigerators, electrically operated, complete, of a storage capacity exceeding 12 cubic feet, and complete mechanical units therefor:									
Commonwealth and Irish Republic.....	29	5	9,164	10	1	1,904	2	1	1,526
Other countries.....	1		826	1		568	10	4	4,956
Total.....	30	5	9,990	11	1	2,472	12	5	6,482
No. 2b—Refrigerating machinery, other than electrically operated refrigerators, and complete mechanical units therefor; parts for refrigerating machinery of all types:									
Commonwealth and Irish Republic.....		1	2,568			815		10	24,497
Other countries.....		8	11,701		7	14,742		4	15,731
Total.....		9	14,269		7	15,557		14	40,228

Source: Same as for exports.

United Kingdom: Imports of Air-conditioning and Refrigerating Equipment, 1955-58¹

Commodity and country of origin	1955			1956			1957		
	Units	Metric tons	Dollars	Units	Metric tons	Dollars	Units	Metric tons	Dollars
No. 1—Air-conditioning machines, self-contained, comprising elements for cooling, control of humidity, cleaning and circulating of air, complete:									
Commonwealth and Irish Republic.....	27	6	15,918	76	10	27,000	104	9	30,624
United States.....	11	2	5,902	25	5	19,225	49	4	16,447
Other countries.....	165	105	268,386	329	85	194,908	175	21	64,943
Total.....	203	113	290,206	430	100	241,133	328	34	112,014
No. 2a—Refrigerators, electrically operated, complete, of a storage capacity exceeding 12 cubic feet, and complete mechanical units therefor:									
Commonwealth and Irish Republic.....	157	14	28,482	208	19	22,702	163	13	20,798
United States.....	148	29	57,697	215	69	134,106	182	27	67,452
Other countries.....	610	102	302,715	352	31	83,359	55	5	10,303
Total.....	915	145	388,894	775	119	240,167	400	45	98,553
No. 2b—Refrigerating machinery, other than electrically operated refrigerators, and complete mechanical units therefor; parts for refrigerating machinery of all types:									
Commonwealth and Irish Republic.....		112	190,372		106	177,730		75	138,631
United States.....		96	579,958		130	542,212		118	694,338
Other countries.....		263	595,502		251	635,950		338	912,454
Total.....		471	1,365,832		487	1,355,892		531	1,745,423

¹ In 1958 imports of air-conditioning machines, complete, and refrigerators and refrigerating equipment, commercial and industrial (No. 3) totaled 54 metric tons valued at \$1,974,168.

Source: Same as for exports.

Venezuela

Production

Venezuela does not produce air conditioning or refrigeration equipment, except for an indeterminate number of walk-in coolers and back bars made of imported materials. No air conditioning or refrigeration equipment is exported.

Channels of Distribution

The principal distribution centers are Caracas and Maracaibo. Air conditioning systems and units, and refrigeration equipment are sold primarily by Caracas or Maracaibo firms having sub-distributors or agents throughout the country. Pasteurization equipment is handled by Caracas firms which send salesmen traveling throughout the country. Petroleum companies and other users of large commercial refrigeration systems often import directly from the United States, but one large petroleum company imports directly from the Sterling Bloc.

Consumption

Unitary Air Conditioners.—Among the factors which made 1958 a boom year for sales of package and self-contained air conditioners were an abnormally hot dry season early in 1958 and fierce competition. However, most important was an intensive advertising campaign in which principal distributors took advantage of the "live better-electrically" campaign conducted by Caracas' power and light companies. As a result of this campaign, 1,673 units were sold in Caracas in a 40-day period, and sales in 1958 were expected to reach nearly 20,000 units, compared with 4,600 units in 1955, 6,200 in 1956, and 13,000 in 1957. All the units purchased were American. Of the units sold, 72 percent were of 1 hp., 16 percent of $1\frac{1}{2}$ hp., 6 percent of $\frac{3}{4}$ hp., and 6 percent of 2 hp. or over.

Approximately 90 percent of all self-contained units are installed in offices and other commercial establishments. The low percentage of installations in homes is expected to continue because less than 500,000 persons in the country have adequate purchasing power to even consider buying air conditioners.

Sales records indicate that the consumption trend is rising rapidly and is expected to continue by more than 10 percent per year, peaking in the next two years, after which replacement will probably become the primary factor. Other sources predict a continuing rise in sales for an indefinite period. The peak has already been hit in Maracaibo, which formerly accounted for 60 percent of all sales. Many in the trade say that the Maracaibo area has been saturated. A similar situation is expected by some trade sources in the Caracas area in two or three years. No other areas approach Caracas or Maracaibo as significant markets.

Central Plant Air Conditioning Equipment.—Central plant air conditioners installed in the Caracas area totaled slightly over 3,500 tons in 1957. No statistics are available for estimating the quantity of installations in the interior of the country. Informed dealers estimated a total 1958 consumption of 10,000–12,000 tons, of which 5,000 tons were expected to be installed in Caracas and vicinity.

Installations should increase significantly in the future. Historically, the people, particularly in Caracas, have not seen the need for air conditioning. However, representatives of light and power companies are now urging architects and contractors to include central air conditioning in building plans because of the higher income potential providing better utilization of high cost land. They also stress cooling, filtering, and noise reduction qualities. This campaign should pay off because Venezuelans are beginning to feel that air conditioning for office and apartment buildings is something to be expected rather than a luxury.

Refrigeration Equipment.—No reliable information is available concerning ice plants, but a leading dealer, the only source in the field, indicates that 1,200 to 1,400 tons of industrial refrigeration units were installed in slaughtering, fish, and ice plants in 1958, and he predicts a rise to nearly 5,000 tons in 1959.

The only statistics on the number of cold storage plants are those compiled in 1957 by the *Direccion de Planificacion, Ministerio de Agricultura y Cria.*

These figures indicate a total of 83,120 cubic meters of cold storage space in the country, including 30,474 cubic meters of Government-owned space and 52,646 cubic meters of privately-owned space.

The future consumption trend is impossible to predict. Many of the present plants are standing idle, and yet the press indicates that the Government-owned marketing organization in Caracas (*Mercados, Silos y Frigorificos del Distrito Federal, SA*) will soon spend \$600,000 to add 30,000 square meters of cold storage space.

The only food-processing refrigeration equipment on which information is obtainable is installed in milk pasteurization plants. Venezuela has 19 such plants, capable of processing about 320,000 liters per day. The equipment in the plants is virtually all American; one or two plants have British equipment, but even these plants are equipped with American refrigeration units. Informed sources predict that two new plants will be built and some expansion of existing plants will occur within the next two years.

Petroleum refiners (excepting one large company) report that 264 small petroleum condensing units are in operation. Purchases are irregular and equipment is imported directly from the United States.

No intelligent estimate of the number of commercial refrigeration units in the country is possible on the basis of locally available statistics. However, over 95 percent of the commercial refrigerators sold are of American origin. Local dealers agree that sales of this equipment will continue to increase about 10 percent annually.

Service Facilities

Excellent service facilities for air conditioning equipment are available in Caracas and Maracaibo. Small parts inventories are maintained by distributors outside Caracas, but business firms prefer having the equipment brought to the city for major repairs. However, many consumers in the interior of the country ordinarily go to small, inadequate repair shops for maintenance of their units.

Commercial refrigeration repair facilities are excellent in Caracas, Maracaibo, and Barquisimeto, and

poor in most other areas. Several distributors service through a mechanic traveling with each salesman. Because of service difficulties, sealed units are preferred in most areas. Units used in pasteurization plants need little servicing. Pasteurizers in the interior carry a small inventory of parts most likely to need replacing. The plants follow the practice of using identical American equipment so they can borrow needed parts from one another when a breakdown occurs and then order replacement parts from the Caracas distributor.

Imports

No breakdown of imports is available. However, from 90-100 percent of all air conditioning and refrigeration equipment sold is of American origin. Using United States export figures and a knowledge of the life of the equipment, it should be relatively easy to estimate not only imports but also the number of units in use.

Import duties on air conditioning and refrigeration equipment are as follows:

Air conditioning:	
0-15 kilos.....	0.50 bolivares per kilo
Over 15 kilos.....	0.01 bolivares per kilo
Refrigeration equipment:	
0-100 kilos.....	0.40 bolivares
100-250 kilos.....	0.50 bolivares/kilo
250-500 kilos.....	0.60 bolivares/kilo
500-up kilos.....	0.40 bolivares/kilo
Trade agreement rate:	
0-100 kilos.....	0.20 bolivares per kilo
100-250 kilos.....	0.30 bolivares per kilo
250-500 kilos.....	0.50 bolivares per kilo
500-up kilos.....	0.40 bolivares per kilo

Market Potential

In view of the existing overwhelming preference for American goods, the United States will probably not expand its export position in this market other than by gradually increasing sales. Direct United States investment is possible but not necessary unless market conditions change. If American domination of the market were lost and local production were economically feasible, local capital participation, although not essential, would be desirable for public relations and contact purposes.

Venezuela: Imports of Air-conditioning and Refrigerating Equipment, 1954-57

[Quantity in metric tons; value in dollars]

Commodity and country of origin	1954		1955		1956		1957	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
No. 333-334 ¹ :								
United States.....			6,136	6,944,871				
Other countries.....			957	723,187				
Total.....			7,093	7,668,058				
No. 333 C—Refrigerating equipment of all types, 250-500 kilograms:								
United States.....	902	1,196,496			921	1,137,439	905	1,241,421
Other countries.....	9	12,995			8	13,202	5	10,366
Total.....	911	1,209,491			929	1,150,641	910	1,251,787
No. 333 D—Refrigerating equipment of all types greater than 500 kilograms:								
United States.....	546	582,090			507	578,475	490	588,585
Other countries.....	29	29,315			6	7,391	10	12,617
Total.....	575	611,405			513	585,866	500	601,202

¹ For the year 1955 Venezuela basketed all forms of refrigeration of all sizes in one category. This group includes domestic and commercial refrigerating equipment, air-conditioning apparatus, ice-boxes, freezer chests, and parts.
Source: *Boletín Mensual de Estadístico*.

West Germany

Production

Essential raw materials—nonferrous metals, glass and insulating materials of all kinds, and power—required by West German manufacturers of air conditioning and refrigeration equipment, are readily available.

According to reliable trade sources, one firm manufacturing air conditioning equipment is a subsidiary company of a Swiss enterprise, utilizing the capital of its parent company. One manufacturer of refrigeration equipment is a wholly-owned subsidiary of a United States enterprise. Other United States firms have licensed several domestic manufacturing firms.

Direct Government subsidies are not available.

Air Conditioning Equipment.—The air conditioning equipment industry is a post-World War II outgrowth of the central heating, ventilating, and refrigeration industries. About 50 firms produce package and room-type air conditioning systems in plants scattered throughout the country. Of these firms, only 5 employ a labor force of more than 500 each. Nearly all the 50 firms manufacture in addition various other types of equipment—air heating and cooling, fume dispersion, and humidifying equipment—and make installations.

The majority of the manufacturers of air conditioning and refrigeration equipment are members of the Association of West German Machinery Manufacturers (Air Cooling and Ventilating Division or Refrigeration Division), Frankfurt-am-Main. Four of the smaller air conditioning firms and 20 refrigeration firms are members of the West German Association of Electrical Equipment Manufacturers, Frankfurt-am-Main.

Under the West German statistical reporting code on industrial production, figures on the production of all types of air conditioning equipment are arranged as follows:

(1) *Air conditioning plants and apparatus*, together with fume dispersion and humidifying installations, and air heating equipment (non-electrical).

(2) *Miscellaneous electro-physical apparatus*

and equipment, together with lightning conductor equipment; electric fishing equipment; electro-osmotic equipment; disinfecting equipment; wood-worm detection equipment; *air conditioning equipment* (electric); electric water fountains for interior decoration (illuminated and nonilluminated).

The estimated production values for all items listed in the two categories during the period 1951–54 were as follows (1 DM equals U.S. \$0.238):

	1951	1952
Plants and apparatus.....	\$1,618,400	\$3,284,400
Miscellaneous apparatus and equipment.....	147,560	211,820
	1953	1954
Plants and apparatus.....	3,736,600	5,926,000
Miscellaneous apparatus and equipment.....	311,780	261,800

A rough percentage production breakdown (by value) for air conditioning equipment for the period 1951–54 is: Plants and apparatus, approximately 30 percent; and miscellaneous apparatus and equipment, approximately 10 percent.

The total estimated production figures for air conditioning equipment during the period 1955–57 is shown in parentheses below:

	1955	1956	1957
Plants and apparatus	\$7,425,600 (2,227,680)	\$9,424,800 (2,827,440)	\$10,519,600 (3,155,880)
Miscellaneous apparatus and equipment.....	61,035 (6,104)	92,930 (9,293)	152,449 (15,245)

The estimated total value of production for package air conditioners, including room types and other types of air conditioning systems such as central plant systems, was \$2,233,784 in 1955; \$2,886,733 in 1956; and \$3,171,125 in 1957. Production of all types of air conditioning units and equipment in 1958 may total an estimated \$3,445,050. The rate of growth in 1959 and 1960 should not show any substantial increase, and will probably follow the same pattern as in 1956, 1957, and 1958.

A comparison of the total production value of air conditioning equipment with the total production value for the entire West German machinery industry in 1957 of \$4,212,600,000 and in 1958 of \$4,331,600,000 indicates that its share is well below 1 percent.

The number of manual and white collar workers employed by the 50 firms producing air conditioning and other equipment totaled about 20,500 in 1957. This was only 2.5 percent of the total 830,000 in the entire machinery industry. The air conditioning industry is a small section of the metals fabricating industry branch, and has much the same wage scale. In 1957, the average hourly wage in the metals fabricating industry amounted to \$0.46; an average work week was 45.2 hours.

Refrigeration Equipment.—Production figures on refrigeration equipment cannot readily be compared with the classifications normally used in the United States. Production figures of several of the available commodity subgroups are consolidated to correspond as closely as possible with the desired commodity breakdowns. Statistics for the following four subgroups were extracted and assembled together under the general heading: Refrigeration Equipment for Industrial and Commercial Uses (section I):

- (1) Small refrigerator and ice plants, up to 20,000 kilocalorie hour
- (2) Large refrigerator and ice plants, and machinery, together with marine refrigerator machinery over 20,000 kilocalorie hour
- (3) Air and gas liquefying and dispersion plants, together with carbon dioxide and dry ice plants
- (4) Spares and elementary parts for the above three items.

Commercial Refrigerators (section II) includes reach-in, walk-in, display cases, etc. This section comprises the following commodity subgroups: Commercial refrigerators and cases over 250 liters, including those equipped with compressor aggregates.

Production values during the period 1954–57 for section I subgroups were as follows (in thousands of dollars):

	1954	1955	1956	1957
Small refrigerator and ice plants.....	9,639	12,044	17,455	12,895
Large refrigerator and ice plants.....	10,972	12,396	9,718	10,286
Air and gas liquefying and dispersion plants.....	10,948	9,226	9,670	15,791
Spares and elementary parts	3,737	4,099	14,758	16,118
	<u>35,296</u>	<u>37,765</u>	<u>51,601</u>	<u>55,090</u>

Production values for section II during the same period were as follows (in thousands of dollars):

	1954	1955	1956	1957
Commercial refrigerators and display cases (Section II) ..	16,683	16,094	14,366	19,120

A comparison of the total value of production of the entire machinery industry with that of the refrigeration equipment industry (sections I and II) during the period 1955–57 is as follows (in thousands of dollars):

	(A) Machinery industry	(B) Refrigeration equipment industry	Refrigeration percentage
1955.....	3,396,210	141,085	4.15
1956.....	3,895,496	139,409	3.57
1957.....	4,215,742	161,234	3.82

Association sources estimate that the total value of production of industrial and commercial refrigeration equipment in 1958 may be about 2 percent of the production value for the entire machinery industry.

Because of the varied manufacturing programs of the approximately 80 domestic-producing firms, figures are available only for the total labor force of the refrigeration equipment industry. In 1957, the number of manual and white collar workers employed in the industry totaled approximately 30,000. This was only 3.6 percent of the total 830,000 employed in the entire machinery industry in 1957. The refrigeration equipment industry is a section of the metals fabricating industry branch. Therefore, the wage scales of the latter are generally applicable. In 1957, the average hourly wage amounted to \$0.46 and an average work week was 45.2 hours.

Channels of Distribution

Distribution and servicing of domestically-manufactured air conditioning equipment is done exclusively by the appropriate sales and servicing departments, or engineering departments, of the various manufacturing companies. These are scattered throughout the country. Distribution and servicing of refrigeration equipment, unless required by industry, is usually done by appointed regional and district wholesalers or independent distributors. Manufacturers or their engineering departments undertake this work only in exceptional cases. Facilities are considered adequate.

Consumption

Air Conditioning Equipment.—An estimated 90 percent or more of all air conditioning equipment is sold on the domestic market. Air conditioning manufacturers produce their equipment according to individual specifications, and do not mass-produce.

At the present time, the principal domestic buyers are such industries as the optical and precision instruments, chemical and pharmaceutical, foodstuffs, paper, and textiles. Sales are also made to large motion picture theaters, insurance companies, and banks.

Demand for private household use of window or package-type air conditioners is practically non-existent now because of climatic conditions and comparative high prices for units.

However, industry sources are fairly confident that the demand for air conditioning equipment, particularly for commercial and industrial purposes, will increase. Quality and workmanship are the most important factors influencing demand.

Domestic retail prices for room-type air conditioners range from \$333-428; for other types from \$1,428-4,760 or more. Imported window air conditioning units retail on the domestic market for \$333-\$595, and package air conditioners and other systems for \$1,904-\$7,140, or higher.

Refrigeration Equipment.—In 1957, an estimated 50 percent of the production of section I refrigeration equipment, and 80 percent section II, was sold on the domestic market. No significant sales fluctuations occurred in either type of refrigeration equipment. Industry sources expect a continual increase in demand for commercial refrigerators (compressor units). Domestic retail prices for section I refrigeration equipment are not readily available because of the complexity of accessory plant equipment involved. Prices of section II commodities start at \$357. Commercial deep freezers retail for \$381-\$643. Quality is the most important factor influencing demand.

Imports

Air Conditioning Equipment.—Precise figures on imports of air conditioning equipment are not available. In 1956 and 1957, trade sources estimated total imports for each year to have been about \$714,000, which exceeds by far the total value of exports. The number of domestic importer/distributors of air conditioning equipment is reportedly small. The principal contacts are with firms in the United States and Switzerland.

Refrigeration Equipment.—Figures on imports of section I refrigeration equipment are readily available. In 1956, the total value of imports of section I refrigeration equipment amounted to \$1,328,040; in 1957, to \$2,455,446.

Imports, (excluding spares), from principal foreign

exporting countries in 1956 and 1957, were as follows:

<i>Country</i>	<i>1956</i>	<i>1957</i>
Great Britain.....	\$237,762	\$716,380
Denmark.....	155,652	178,500
Sweden.....	125,902	241,570
U.S.A.....	45,220	267,036

In 1957, the United States became the second largest supplier of section I refrigeration equipment for industrial and commercial uses. This was because in 1957 West German import restrictions on refrigerating equipment were lifted from the Dollar Area.

The import values of Section II commodities and household refrigerators are grouped together into one general section (see table). According to the *Vereia Deutscher Maschinenbau-Anstalten* (Refrigeration Division), the combined total import value of section II refrigeration equipment and household refrigerators totaled \$1,393,252 in 1956 and \$2,119,866 in 1957. However, the total arrived at by the addition of separate *Zentralverband der Elektrotechnischen Industrie* and *Vereia Deutscher Maschinenbau-Anstalten* statistics amounted to \$1,678,852 in 1956 and \$2,518,278 in 1957. This apparent discrepancy occurs because *Vereia Deutscher Maschinenbau-Anstalten* calculations include other accessories and spares.

Under the amalgamated *Vereia Deutscher Maschinenbau-Anstalten* (Refrigeration Division) statistics, no accurate measurement would be made regarding the share of the main exporting countries of refrigeration equipment (section II and household refrigerators) into West Germany. To obtain this information, the separate *Zentralverband der Elektrotechnischen Industrie* and *Vereia Deutscher Maschinenbau-Anstalten* statistics were analyzed and appropriate figures extracted. In 1957, a total of \$1,031,016 worth of nonelectrical refrigeration equipment was exported by the following to Germany: Sweden, 49 percent; United States, 26 percent; Denmark, 12 percent; and Great Britain, 10 percent.

In 1957, the following countries supplied a total of \$1,487,262 in electrical refrigeration equipment: Great Britain, 80 percent; Denmark, 8 percent; United States, 3 percent; and Sweden, 2 percent. The number of domestic importer/distributors of refrigeration equipment is small.

Import Duties

Import duties on air conditioning and refrigeration equipment are as follows:

Tarif No.	Import duty in percent ad valorem	Turnover tax (assessed on the duty-paid value)
84.12 Air conditioning machines, self-contained, compris- ing a motor-driven fan and elements for changing the tempera- ture and humidity of air	4	6
84.15 Refrigerators and refriger- ating equipment, elec- trical and others.....	4	6
Refrigerating cabinets and other refrigerating furniture, incorporating a refrigerator unit, of an effective capacity of more than 250 liters....	2	6

These duty rates and taxes apply to imports from both the United States and the member countries of the European Economic Community (Common Market).

Exports

Air Conditioning Equipment.—Annual exports of air conditioning equipment total about 3–5 percent of the estimated annual value of production. Based on 1958 production of about \$3,445,050, total exports (using 5 percent) were expected to amount to only \$172,253 in 1958. Principal export markets are Lebanon and other countries in the Near and Middle East.

Refrigerating Equipment.—Under the West German foreign trade commodity classification, statistics on the value of exports of refrigerating equipment are available only for the commodities under section I. Export figures for commodities under section II, and household refrigerators are grouped together into one general section and cannot be separated.

In 1956, the value of West German exports of the commodities listed under section I amounted to \$14,041,048, or about 27 percent of domestic production. The value of exports of the same commodity group in 1957 increased by about 25 percent and amounted to \$17,465,630—approximately 45 percent of domestic production. The principal customers in 1956 were the Netherlands, Spain, Austria, the United States, India, and Brazil. In 1957, Italy became the chief buyer, followed by the United States, Belgium-Luxembourg, Japan, and Great Britain.

West German exports, by value of section I refrigeration equipment, were as follows in 1956–57, according to *Vereia Deutscher Maschinenbau-Anstal-*

ten and Zentralverband der Elektrotechnischen Industrie:

Country	1956	1957
<i>Europe</i>		
Netherlands.....	\$1,573,418	\$767,788
Spain.....	1,555,092	218,722
Austria.....	867,034	569,534
France.....	547,876	104,720
Belgium-Luxembourg.....	500,990	1,038,156
Turkey.....	287,980	608,566
Sweden.....	255,162	462,196
Finland.....	228,718	23,562
Italy.....	195,160	3,290,826
Great Britain.....	148,036	946,526
Greece.....	51,646	797,062
Czechoslovakia.....	Not available	624,036
<i>Overseas</i>		
United States.....	1,366,120	2,732,240
India.....	1,123,598	182,308
Brazil.....	1,107,652	246,568
Iran.....	310,114	31,034
Iraq.....	132,804	46,648
Japan.....	26,894	1,116,458
Peru.....	81,396	679,966
Mexico.....	55,930	223,958

The combined total export value of household refrigerators and section II refrigeration equipment was \$16,984,156 in 1956 and \$21,879,102 in 1957. According to reliable trade sources, the principal customers during these years were Belgium-Luxembourg, the Netherlands, North and South America, and Near Eastern countries.

Market Potential and Licensing Opportunities

Air Conditioning Equipment.—The country now exports almost no air conditioning equipment to the United States. No change in this situation is likely to occur. The United States supplies by far the greatest amount of air conditioning equipment, and will probably supply even more, particularly for industrial and commercial purposes. Although quality is the major consideration, sales might possibly increase at a higher rate if prices were lowered. Prices should tend to influence any future demand for units, particularly in private households.

The two trade associations consider that a more intensified exchange of licenses and patents between domestic and United States manufacturers would benefit both countries in many cases—for both air conditioning and refrigeration equipment. The associations would welcome any such offers from United States companies, as well as any other kind

of cooperation, either on the company level or between competent engineering associations and institutes.

Refrigeration Equipment.—In 1957, exports of refrigeration equipment to the United States totaled \$3,552,864, or 8 percent of total exports of \$42,932,582. Reliable industry sources expect this share to be maintained in the future. In 1957, the United States' share of refrigeration equipment imports was \$611,848—12 percent of total imports of \$4,973,724. The United States will probably

remain a chief supplier of refrigeration equipment for industrial and commercial uses, and is reportedly the principal supplier of commercial deep freezers, although reliable estimates are not available. United States exports to West Germany of self-contained commercial refrigerators and freezers in 1958 tripled 1956 and increased greatly over 1957.

According to trade sources, United States sales may increase in the future. Although quality is the major consideration, a lowering of prices might result in a higher rate of increase.

West Germany: Foreign Trade in Air-conditioning and Refrigerating Equipment, 1955-58

[Quantity in metric tons; value in \$1,000]

Commodity and country	1955		1956		1957		1958	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
Imports								
No. 8414—Ventilators; exhausters and blowing machines; air-conditioning apparatus and plant; parts and spare parts.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
No. 8416—Air-conditioning plant; parts and spare parts:								
United States.....	79	282	145	558	96	366		
Other countries.....	140	425	197	517	202	634		
Total.....	219	707	342	1,075	298	1,000		
No. 8420—Cooling towers and cooling plant for energy production; industrial refrigerators and frigorific and artificial ice-producing plant of which the constituent elements are not mounted on a common base plate; other machinery and plant, excluding autoclaves for the paper making industry; parts and spare parts for air and gas liquefying and decomposing apparatus:								
United States.....	245	517	256	441	243	632		
Other countries.....	1,495	2,424	1,710	3,122	2,730	4,992		
Total.....	1,740	2,941	1,966	3,563	2,973	5,624		
No. 8422—Refrigerating machinery, apparatus and appliances, whether or not fitted with electrical equipment:								
United States.....	113	243	135	305	271	461		
Other countries.....	1,096	1,634	1,573	2,340	1,638	32,504		
Total.....	1,209	1,877	1,708	2,645	1,909	32,965		
No. 8412—Air-conditioning installations for controlling temperature of air:								
United States.....							131	422
Other countries.....							679	2,035
Total.....							810	2,457
No. 8415—Machinery, apparatus, and devices for generation of cold, driven electrically or otherwise; cooling apparatus domestic and industrial:								
United States.....							397	842
Other countries.....							3,361	5,564
Total.....							3,758	6,406
Exports								
No. 8414—Ventilators; exhausters and blowing machines; air-conditioning apparatus and plant; parts and spare parts. ¹	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
No. 8416—Air-conditioning plant; parts and spare parts:								
United States.....						4		
Other countries.....	821	1,428	1,505	2,666	1,093	2,044		
Total.....	821	1,428	1,505	2,666	1,093	2,048		
No. 8420—Cooling towers and cooling plant for energy production; industrial refrigerators and frigorific and artificial ice-producing plant of which the constituent elements are not mounted on a common base plate; other machinery and plant, excluding autoclaves for the paper making industry; parts and spare parts for air and gas liquefying and decomposing apparatus:								
United States.....	846	1,874	1,906	4,428	1,668	4,308		
Other countries.....	74,733	71,492	80,537	90,106	99,341	116,416		
Total.....	75,579	73,366	82,443	94,534	101,009	120,724		

West Germany: Foreign Trade in Air-conditioning and Refrigerating Equipment, 1955-58—Continued

[Quantity in metric tons; value in \$1,000]

Commodity and country	1955		1956		1957		1958	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
	Exports							
No. 8422—Refrigerating machinery, apparatus and appliances, whether or not fitted with electrical equipment:								
United States.....	66	94	249	353	328	469		
Other countries.....	12,421	18,065	14,359	21,798	17,903	27,469		
Total.....	12,487	18,159	14,608	22,151	18,231	27,938		
No. 8412—Air-conditioning installations for controlling temperature of air:								
United States.....							1	6
Other countries.....							1,718	3,581
Total.....							1,719	3,587
No. 8415—Machinery, apparatus, and devices for generators of cold, driven electrically or otherwise; cooling apparatus domestic and industrial:								
United States.....							457	732
Other countries.....							23,272	38,058
Total.....							23,729	38,790

N. A.—not available.

Source: *Foreign Trade of the Republic of Germany*, Federal Statistical Office, Part II.

**U.S. Export Statistics, by Country,
1956-1959**

U.S. Exports of Air-conditioning and Refrigeration Equipment Excluding Domestic Refrigeration, by Country of Destination

1956

[Quantities in units; values in dollars]

Commodity number and description	Australia		Belgian Congo and Ruanda-Urundi		Belgium-Luxembourg		Brazil		Colombia		France		French West Africa and Guinea		India	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
COMPONENTS																
76457—Compressors and condensing units, 1/5-1 hp.			405	51,694	3,834	210,354	11,998	453,868	2,464	262,087	1,615	81,057	149	13,728	7,113	626,258
76459—Compressors and condensing units, 1-3 hp.	10	13,800	17	5,313	126	32,902	64	16,186	44	12,140	67	13,666	87	15,059	218	42,110
76463—Compressors and condensing units, 3-10 hp.	20	7,890		2,232	25	13,587	155	55,568	49	33,042	47	26,285			120	74,647
76465—Reciprocating compressors and condensing units, 10-30 hp.	32	32,552			11	10,136	11	24,493	9	17,568	2	1,133			85	109,845
76468—Reciprocating compressors and condensing units, over 30 hp.	45	99,232	1	2,550			20	42,781	31	61,878	20	33,640			81	242,396
76471—Centrifugal refrigeration units.	3	109,516	1	16,637	3	67,443			1	6,143	1	44,799			17	606,573
76473—Absorption, adsorption, and steam-jet refrigeration.											5	22,236			1	7,418
76481—Evaporative condensers and receivers.			5	15,278	1	2,616	2	6,303	22	51,692					5	2,108
76483—Condensers, except evaporative and receivers.															56	40,034
76491—Heat transfer equipment, not elsewhere classified, and parts.				8,088			15	5,100	3	6,447						
76601—Auxiliary and accessory equipment, not elsewhere classified, and parts.		35,824														134,133
76603—Parts, not elsewhere classified, for foreign assembly and manufacture.		2,660		13,919												397,900
76605—Replacement parts, not elsewhere classified.		71,794		44,579		41,948		58,404		91,560		98,029		11,232		320,756
REFRIGERATION																
76505—Ice-making machines, not elsewhere classified, and parts.		982		1,939		607		44,887		5,562		11,759		581		61,398
76561—Self-contained commercial refrigerators and freezers, not elsewhere classified.	27	38,170	301	93,201	247	69,557	47	32,053	760	353,322	686	133,796	182	35,758	40	20,192
76563—Liquid coolers for water, brine, etc.	15	4,822			3	15,505	1	2,855	15	45,982	4	2,879			11	19,546
76591—Commercial refrigerators and freezers, except self-contained.	1	7,365	56	33,872	1	7,200	13	21,031	731	463,041	24	37,843	12	10,179	2	473
AIR-CONDITIONING																
76571—Self-contained air-conditioners, under 2 ton.	10	1,830	2,810	557,415	186	35,428	259	59,723	972	177,502	41	14,281	1,976	390,336	1,034	259,881
76575—Self-contained air-conditioners, 2 ton and over.	10	20,732	10	41,133	48	52,781	28	77,195	76	199,178	34	62,174	32	27,552	193	259,508
76576—Air-conditioners, except self-contained and air-handling units, not elsewhere classified.	6	29,555	116	27,644	27	17,063	70	40,078	179	93,299	25	5,593	133	23,431	463	313,351
Total		476,724		916,984		671,095		1,011,086		2,779,390		1,061,885		548,523		3,587,213

COMMENTS	Italy		Japan		Mexico		The Netherlands		Pakistan		Union of South Africa		United Kingdom		Venezuela		West Germany	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
67457—Compressors and condensing units, 1/8-1 hp.	3,733	172,307	322	25,494	5,287	413,825	1,017	51,276	75	6,269	2,458	162,282	2,401	101,377	2,084	320,327	1,718	94,919
67459—Compressors and condensing units, 1-3 hp.	80	17,567	26	7,737	307	130,997	103	11,543	2	2,300	373	95,331			658	152,191	125	19,257
67463—Compressors and condensing units, 3-10 hp.	94	41,591	293	73,905	336	237,409	111	39,841	10	7,301	56	28,744	41	23,093	92	58,315	69	24,098
67465—Reciprocating compressors and condensing units, 10-30 hp.	62	62,627	17	28,915	67	136,326	63	56,262	7	15,073	22	25,748	3	4,818	37	54,412		
67468—Reciprocating compressors and condensing units, over 30 hp.	67	146,733	10	32,882	90	342,474	19	29,927	7	56,110	20	58,472			30	79,251	12	45,503
67471—Centrifugal refrigeration units.			1	15,152			3	164,836			1	25,857			3	57,912		
67473—Absorption, adsorption, and steam-jet refrigeration.			2	2,510	126	61,726			3	23,425	10	2,640						
67481—Evaporative condensers and receivers.	1	2,418	2	5,417	78	117,872	2	3,074			17	26,375			185	107,941		
67483—Condensers, except evaporative and receivers.	11	4,436	30	18,596	139	41,008	20	26,270	3	2,915	8	7,119	5	4,879	73	19,683	1	1,980
67491—Heat transfer equipment, not elsewhere classified, and parts.		36,543		59,228		169,557		33,397		1,046		68,491				104,070		7,493
67601—Auxiliary and accessory equipment, not elsewhere classified, and parts.		62,486		53,718		473,917		14,832		52,599		35,616		24,648		189,898		5,724
67603—Parts, not elsewhere classified, for foreign assembly and manufacture.		20,324		49,785		410,922		4,318		41,953		584		68,429		71,508		18,582
67605—Replacement parts, not elsewhere classified.		25,361		25,245		335,838		20,879		28,339		111,607		32,398		218,400		63,614
REFRIGERATION																		
676505—Ice-making machines, not elsewhere classified, and parts.		40,811		28,125		501,425		1,961		40,701		10,407		94,404		166,110		10,258
676561—Self-contained commercial refrigerators and freezers, not elsewhere classified.	139	20,032	633	150,329	421	162,323	292	102,740	139	39,451	518	154,703	71	41,237	5,380	1,601,693	1,064	457,162
676563—Liquid coolers for water, brine, etc.	2	6,189	24	20,736	74	146,375	16	21,083	7	12,317	37	10,102			103	101,748	2	2,084
676591—Commercial refrigerators and freezers, except self-contained.	59	45,208	2	11,255	45	110,095	11	18,727	1	1,158	9	25,230			1,978	1,180,413	24	14,168
AIR-CONDITIONING																		
676571—Self-contained air-conditioners, under 2 ton.	1,175	248,200	967	171,168	1,804	334,504	155	39,195	1,406	326,807	1,175	263,015			6,180	1,268,168	461	98,859
676575—Self-contained air-conditioners, 2 ton and over.	208	195,559	123	190,568	187	233,430	41	38,011	20	42,840	138	210,405	8	8,865	275	292,745	34	37,330
676576—Air-conditioners, except self-contained and air-handling units, not elsewhere classified.	176	45,045	86	52,898	5,322	620,183	335	53,368	36	19,479	132	15,966	8	5,435	1,878	353,933	197	20,464
Total.		1,193,437		1,023,723		5,000,206		731,540		720,083		1,338,644		409,583		6,398,738		922,365

Source: Report No. FT-410, Part II, U. S. Exports of Domestic and Foreign Merchandise, Bureau of the Census, U. S. Department of Commerce.

U.S. Exports of Air-conditioning and Refrigeration Equipment Excluding Domestic Refrigeration, by Country of Destination

1957

[Quantity in units; value in dollars]

Commodity number and description	Australia		Belgian Congo and Ruanda-Urundi		Belgium-Luxembourg		Brazil		Colombia		France		French West Africa and Guinea		India	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
COMPONENTS																
76457—Compressors and condensing units, 1/5-4 hp.	3	1,022	320	31,893	3,409	206,201	5,242	236,904	3,199	275,433	3,110	144,582	111	11,636	9,390	633,874
76459—Compressors and condensing units, 1-3 hp.	6	2,440	1	537	133	28,023	550	59,813	31	13,214	24	4,016	31	7,366	412	87,427
76463—Compressors and condensing units, 3-10 hp.	75	57,775	2	9,568	112	39,258	296	136,396	20	23,829	48	15,259	2	870	129	81,640
76465—Reciprocating compressors and condensing units, 10-30 hp.	63	127,227	4	8,365	29	30,471	16	24,270	5	15,060	15	12,420			187	207,813
76471—Centrifugal compressors and condensing units, over 30 hp.	1	11,117	5	81,109	1	63,096	45	170,327	6	29,666	17	24,500			104	233,093
76473—Absorption, adsorption, and steam-jet refrigeration.			1	20,637							3	186,961			7	174,329
76481—Evaporative condensers and receivers.			4	1,120	45	3,440	13	33,044	12	22,036					209	5,912
76483—Condensers, except evaporative and receivers.	16	3,665	1	298			10	19,063			1	825			95	72,837
76491—Heat transfer equipment, not elsewhere classified, and parts.		8,714		25,102		36,638		12,280		34,455		6,421				208,216
76601—Auxiliary and accessory equipment, not elsewhere classified, and parts.		31,040		44,069		28,713		37,095		286,959		6,639		3,020		312,549
76603—Parts, not elsewhere classified, for foreign assembly and manufacture.		33,606		8,025		44,405		91,793		40,529		823,178				251,882
76605—Replacement parts, not elsewhere classified.		61,784		30,521		67,038		118,025		115,248		72,340		11,528		415,016
REFRIGERATION																
76505—Ice-making machines, not elsewhere classified, and parts.		1,000				679		38,889		29,996		15,167		4,308		12,277
76561—Self-contained commercial refrigerators and freezers, not elsewhere classified.	27	8,423	225	89,336	451	118,575	39	59,622	168	81,830	920	156,698	158	36,316	110	43,750
76563—Liquid coolers for water, brine, etc.	18	12,996	10	23,792	14	36,313	6	27,016	4	9,449	9	46,225			31	81,837
76591—Commercial refrigerators and freezers, except self-contained.	15	10,586	78	63,067	5	6,861	3	16,706	43	23,633	32	50,952	12	7,710	31	29,901
AIR-CONDITIONING																
76571—Self-contained air-conditioners, under 2 ton.	9	9,173	2,979	549,055	178	33,450	327	77,659	86	20,734	45	17,001	2,311	444,189	2,121	616,582
76575—Self-contained air-conditioners, 2 ton and over.	3	1,886	31	41,811	56	57,486	33	44,513	132	182,222	14	34,267	14	10,367	261	333,969
76576—Air-conditioners, except self-contained and air-handling units, not elsewhere classified.	2	12,118	227	41,511	486	39,634	105	24,124	506	105,441	46	40,641	745	140,560	582	278,780
Total		394,572		1,066,883		870,283		1,227,539		1,309,734		1,842,135		677,840		4,083,594

	Italy		Japan		Mexico		The Netherlands		Pakistan		Union of South Africa		United Kingdom		Venezuela		West Germany	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
COMPONENTS																		
76457—Compressors and condensing units, 1/5-1 hp.	5,794	231,172	922	39,391	7,822	517,350	762	42,984	29	2,314	2,270	183,133	400	13,778	3,142	332,910	2,653	134,597
76459—Compressors and condensing units, 1-3 hp.	357	43,360	53	10,231	527	154,113	132	12,290	20	4,763	569	130,116	100	6,269	554	199,734	220	32,743
76463—Compressors and condensing units, 3-10 hp.	230	68,296	56	32,047	351	211,799	128	38,736	10	12,061	85	49,120	33	11,323	160	105,241	129	56,076
76465—Reciprocating compressors and condensing units, 10-50 hp.	174	231,611	20	21,680	67	92,753	142	132,734	17	35,410	25	31,810	10	4,441	37	55,721		
76468—Reciprocating compressors and condensing units, over 30 hp.	28	104,503	13	43,108	90	320,495	68	94,265	7	21,836	35	83,623			27	130,891	4	3,558
76471—Centrifugal refrigeration units.	6	278,729	2	82,300									1	26,608	7	225,693	2	58,101
76473—Absorption, adsorption, and steam-jet refrigeration.					126	51,301									1	4,650		
76481—Evaporative condensers and receivers.	2	6,188	26	32,494	78	137,176	29	12,081	5	5,672	38	51,945			61	105,356	1	2,000
76483—Condensers, except evaporative and receivers.	23	18,709	25	28,735	130	80,467	8	9,476	4	4,112	9	9,531			118	46,829	2	1,545
76491—Heat transfer equipment, not elsewhere classified, and parts.		52,659		524,253		195,689		7,911		4,483		84,764				942,937		
76601—Auxiliary and accessory equipment, not elsewhere classified, and parts.		77,260		67,497		416,822		27,792		18,735		77,458				284,737		15,115
76603—Parts, not elsewhere classified, for foreign assembly and manufacture.		188,186		125,278		390,826		28,749		14,473		10,876				129,042		47,239
76605—Replacement parts, not elsewhere classified.		61,364		72,961		447,057		66,009		38,172		151,881				318,471		54,483
REFRIGERATION																		
76505—Ice-making machines, not elsewhere classified, and parts.				8,312		486,947		2,072		41,072		3,074				159,040		5,145
76561—Self-contained commercial refrigerators and freezers, not elsewhere classified.	180	52,707	496	115,076	460	225,517	261	96,720	60	20,467	1,479	318,729	41	31,912	7,333	2,339,106	2,025	927,222
76563—Liquid coolers for water, brine, etc.	5	21,339	54	22,474	98	125,992	8	22,870	2	3,405	168	22,093	28	14,429	43	91,195	2	11,049
76591—Commercial refrigerators and freezers, except self-contained.	56	39,457	37	72,143	112	117,768	46	69,192	6	28,457	49	33,887	7	14,133	2,309	1,338,633	51	56,578
AIR-CONDITIONING																		
76571—Self-contained air-conditioners, under 2 tons.	1,769	360,356	558	136,908	2,641	481,105	117	29,270	1,649	417,861	2,206	490,337	36	8,608	12,915	2,510,605	661	131,761
76575—Self-contained air-conditioners, 2 tons and over.	132	175,666	60	245,483	276	486,864	70	71,781	36	84,850	150	219,581	7	9,408	532	621,198	75	70,814
76576—Air-conditioners, except self-contained and air-handling units, not elsewhere classified.	357	71,957	131	117,518	5367	675,715	515	111,907	242	38,957	273	66,269	20	1,500	1,587	318,349	327	54,063
Total		2,083,519		1,767,889		5,621,756		876,739		707,130		1,988,230		257,907		10,210,338		1,662,119

Source: Report No. FT-410, Part II, U. S. Exports of Domestic and Foreign Merchandise, Bureau of the Census, U. S. Department of Commerce.

U.S. Exports of Air-conditioning and Refrigeration Equipment Excluding Domestic Refrigeration, by Country of Destination

1958

[Quantity in units; value in dollars]

Commodity number and description	Australia		Belgian Congo and Ruanda-Urundi		Belgium-Luxembourg		Brazil		Colombia		France		French West Africa and Guinea		India	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
COMPONENTS																
76457—Compressors and condensing units, 1/5-1 hp.			462	46,324	2,782	161,040	4,375	19,616	4,555	370,633	662	30,666	162	14,760	1,501	91,586
76459—Compressors and condensing units, 1-3 hp.	1	860	37	7,138	325	51,602	441	50,967	37	3,210	74	44,712	14	4,618	213	31,916
76463—Compressors and condensing units, 3-10 hp.	2	610	10	7,785	50	18,192	609	109,708	46	33,269	60	16,494	1	1,309	99	76,567
76465—Reciprocating compressors and condensing units, 10-30 hp.	13	14,370	1	1,975	18	16,519	72	68,372	65	61,799	5	2,794	6	6,588	60	85,162
76468—Reciprocating compressors and condensing units, over 30 hp.	77	140,713	1	25,184	12	32,341	31	100,765	20	83,357	22	53,401	8	6,584	44	77,589
76471—Centrifugal refrigeration units.															9	230,355
76473—Absorption, adsorption, and steam-jet refrigeration.																
76481—Evaporative condensers and receivers.																
76483—Condensers, except evaporative and receivers.					1	2,753	4	558	18	27,435	1	1,537			601	10,918
76491—Heat transfer equipment, not elsewhere classified, and parts.		12,666			22	11,682			8	8,463	2	1,648			215	29,636
76601—Auxiliary and accessory equipment, not elsewhere classified, and parts.		72,015				24,169				60,370		14,569		1,269		52,308
76603—Parts, not elsewhere classified, for foreign assembly and manufacture.		5,670				47,475				99,459		37,471		4,934		212,863
76605—Replacement parts, not elsewhere classified.		130,213				27,861				35,240		323,051		6,724		260,897
						43,363				133,375		237,735		40,392		198,581
						2,862				16,787		9,522				
76505—Ice-making machines, not elsewhere classified, and parts.																
76561—Self-contained commercial refrigerators and freezers, not elsewhere classified.	12	5,560	353	138,473	387	155,755	17	11,602	99	46,653	412	1,718,877	299	77,976	24	16,451
76563—Liquid coolers for water, brine, etc.			264	29,472	11	15,613	11	68,917	8	25,346			3	1,348	11	39,515
76591—Commercial refrigerators and freezers, except self-contained.	2	2,059	81	57,429	8	9,664	4	12,782			18	33,369	14	10,040	2	59,898
AIR-CONDITIONING																
76571—Self-contained air-conditioners, under 2 ton.	66	18,338	4,954	862,672	64	15,496	224	49,231	396	77,173	105	23,370	5,684	1,094,753	2,515	389,461
76575—Self-contained air-conditioners, 2 ton and over.	481	249,724	11	16,069	46	44,088	6	5,600	59	99,142	12	21,901	59	68,740	106	113,017
76576—Air-conditioners, except self-contained and air-handling units, not elsewhere classified.	18	8,763	60	21,765	45	11,760	131	42,002	1,807	183,864	50	4,462	75	4,481	169	120,340
Total.		661,591		1,273,882		692,235		1,408,241		1,365,575		2,575,579		1,344,516		2,097,091

	Italy		Japan		Mexico		The Netherlands		Pakistan		Union of South Africa		United Kingdom		Venezuela		West Germany	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
COMPONENTS																		
76457—Compressors and condensing units, 1/5-1 hp.	4,472	195,722	294	10,803	18,245	916,481	733	46,081	46	6,814	2,297	166,241	88	3,853	3,864	373,672	1,296	75,235
76458—Compressors and condensing units, 1-3 hp.	783	74,470	1,357	242,400	288	31,323	288	31,323	21	16,557	415	80,462	39	3,148	746	175,990	732	79,073
76463—Compressors and condensing units, 3-10 hp.	379	107,037	13	24,165	277	158,171	267	48,984	52	23,594	146	50,692	3	5,470	323	189,345	282	115,411
76465—Reciprocating compressors and condensing units, 10-30 hp.	93	107,997	10	19,863	64	126,789	87	84,463	12	23,602	51	55,314	3	9,685	22	33,536	36	32,458
76468—Reciprocating compressors and condensing units, over 30 hp.	84	195,580	12	37,469	60	188,887	13	20,457	10	29,453	29	100,474			31	124,591	4	8,802
76471—Centrifugal refrigeration units	2	222,257	2	73,580	2	8,940	4	132,873			12	470,246			10	148,194	2	70,559
76473—Absorption, adsorption, and steam-let refrigeration receivers			15	34,976														
76481—Evaporative condensers and receivers	3	3,600	1	535	177	151,455			2	4,361	35	20,062			30	64,959	4	3,424
76483—Condensers, except evaporative and receivers			9	18,435	26	51,349	14	18,676	13	5,745	14	17,205			380	87,029	5	11,665
76491—Heat transfer equipment, not elsewhere classified, and parts		62,145		40,342		166,691		17,276		5,516		131,386				154,500		2,932
76601—Auxiliary and accessory equipment, not elsewhere classified, and parts		50,198		35,073		513,247		33,630		36,580		88,127		6,373		292,946		30,547
76603—Parts, not elsewhere classified, for foreign assembly and manufacture		36,628		43,597		286,764		26,487		5,126		24,624		33,437		84,213		127,868
76605—Replacement parts, not elsewhere classified.		58,529		35,848		380,895		32,446		48,694		118,507		36,379		567,613		67,635
REFRIGERATION																		
76505—Ice-making machines, not elsewhere classified, and parts		3,636		4,289		516,904				20,080		30,010		19,507		166,263		16,416
76561—Self-contained commercial refrigerators and freezers, not elsewhere classified	65	53,969	156	47,193	1,498	262,827	231	88,442	54	15,591	937	286,636	32	26,665	13,191	4,274,378	3,439	1,715,757
76563—Liquid coolers for water, brine, etc.	15	35,264	24	39,856	82	97,061	3	2,562	4	29,994	17	42,070	1	914	148	169,963	41	52,045
76591—Commercial refrigerators and freezers, except self-contained.	24	18,654	14	2,695	47	96,066	63	58,047	11	4,451	21	31,537	3	4,310	951	488,938	41	25,430
AIR-CONDITIONING																		
76571—Self-contained air-conditioners, under 2 ton.	2,556	533,461	207	49,619	5,132	628,928	207	46,015	1,452	346,114	2,430	476,996	29	10,217	22,351	4,240,207	1,070	182,515
76575—Self-contained air-conditioners, 2 ton and over.	389	363,009	49	217,061	322	342,093	37	53,997	185	273,775	236	336,488			926	882,882	68	77,040
76576—Air-conditioners, except self-contained, and air-handling units, not elsewhere classified.	280	83,447	100	51,871	2,179	251,876	210	71,776	29	30,423	594	66,298	33	11,751	4,032	541,436	92	6,631
Total.		2,205,003		752,294		5,422,800		814,035		926,520		2,573,555		171,709		13,090,655		2,710,443

Source: Report No. FT-410, Part II, U. S. Exports of Domestic and Foreign Merchandise, Bureau of the Census, U. S. Department of Commerce.

U.S. Exports of Air-conditioning and Refrigeration Equipment Excluding Domestic Refrigeration, by Country of Destination

1959

[Quantity in units; value in dollars]

Commodity number and description	Australia		Belgian Congo and Ruanda-Urundi		Belgium-Luxembourg		Brazil		Colombia		France		French West Africa and Guinea		India	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
COMPONENTS																
76457—Compressors and condensing units, 1/5-1 hp.	37	4,400	562	50,071	2,081	137,372	4,832	245,965	8,020	557,142	189	11,122	172	15,631	7,328	511,991
76459—Compressors and condensing units, 1-3 hp.			60	10,340	591	85,176	272	41,418	365	33,683	392	39,785	46	6,672	2,733	166,325
76463—Compressors and condensing units, 3-10 hp.	126	75,373	12	5,297	44	17,400	428	108,339	47	46,740	46	13,683	17	4,006	137	69,600
76465—Reciprocating compressors and condensing units, 10-30 hp.	11	11,799	2	3,749	14	15,273	55	43,182	16	13,734	7	9,465			94	113,262
76468—Reciprocating compressors and condensing units, over 30 hp.	91	175,042	2	2,602	8	11,976	36	130,727	12	51,884	21	51,804			80	154,184
76471—Centrifugal refrigeration units.	2	23,429			1	19,100	3	75,059			1	20,297			4	105,115
76473—Absorption, adsorption, and steam-jet refrigeration.																
76481—Evaporative condensers and receivers.			2	1,549			4	6,217	17	9,802					5	7,600
76483—Condensers, except evaporative and receivers.					16	6,855	2	1,818	2	2,523					93	32,274
76491—Heat transfer equipment, not elsewhere classified, and parts.		4,133				23,928		11,347		39,275		46,391		3,001		20,911
76601—Auxiliary and accessory equipment, not elsewhere classified, and parts.		103,998		3,308		52,062		34,689		52,514		33,718		2,562		46,112
76603—Parts, not elsewhere classified, for foreign assembly and manufacture.		31,132		1,349		25,145		219,663		10,404		806,658		7,258		7,249
76605—Replacement parts, not elsewhere classified.		212,814		17,156		56,641		309,654		207,135		55,637		26,752		213,749
		3,613				5,923		2,563		42,476		6,821				
REFRIGERATION																
76505—Ice-making machines, not elsewhere classified, and parts.						232,098	34	15,412	71	23,271	640	181,670	41	12,278	84	93,393
76561—Self-contained commercial refrigerators and freezers, not elsewhere classified.	16	8,098	202	63,607	486	34,174	20	157,342	2	4,607	3	11,598			13	45,785
76563—Liquid coolers for water, brine, etc.			33	16,676	2	3,319	7	39,605	4	2,946	30	53,884			2	5,056
76591—Commercial refrigerators and freezers, except self-contained.																
AIR-CONDITIONING																
76571—Self-contained air-conditioners, under 2 ton.	77	17,504	2,969	548,986	140	32,318	349	70,118	557	111,922	31	6,779	2,083	385,457	861	126,795
76575—Self-contained air-conditioners, 2 ton and over.	103	30,874	19	21,262	56	49,419	33	60,739	43	21,037	17	11,550	62	67,970	41	46,840
76576—Air-conditioners, except self-contained and air-handling units, not elsewhere classified.	20	20,113	88	6,640	60	14,999	65	123,353	137	59,448	7	3,712	91	3,401	120	100,263
Total		722,322		754,709		823,178		1,697,210		1,290,543		1,364,574		545,018		1,866,504

	Italy		Japan		Mexico		The Netherlands		Pakistan		Union of South Africa		United Kingdom		Venezuela		West Germany	
	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value	Quantity	Value
COMPONENTS																		
70457—Compressors and condensing units, 1/5-1 hp.	3,890	181,054	21	1,721	10,470	569,150	495	48,529	10	1,204	5,814	358,473	813	25,461	5,974	493,650	11,269	443,867
70459—Compressors and condensing units, 1-3 hp.	707	64,711	12	3,092	2,049	273,674	323	39,749	82	22,834	583	131,884	6	2,162	682	164,542	652	83,275
70463—Compressors and condensing units, 3-10 hp.	354	120,443	6	7,143	343	158,947	161	50,484	2	805	179	67,613	12	4,143	273	144,263	397	100,692
70465—Reciprocating compressors and condensing units, 10-30 hp.	72	68,680	12	14,459	76	105,953	134	122,864	9	12,781	38	39,417	8	16,095	66	60,164	44	33,393
70468—Reciprocating compressors and condensing units, over 30 hp.	102	256,745	9	41,590	62	208,931	17	41,436	11	38,843	44	100,570	11	34,437	40	134,052	5	11,303
70471—Centrifugal refrigeration units.	6	223,610			3	72,650	2	58,675	2	51,701	5	142,567	4	197,678	4	122,530		
70473—Absorption, adsorption, and steam-jet refrigeration.									1	25,063								
70481—Evaporative condensers and coolers.	3	4,079	7	8,100	120	99,830			10	24,700	9	14,721			19	40,514	3	5,250
70483—Condensers, except evaporative and receivers.	86	25,148	12	66,834	44	32,415	7	4,687	22	15,593	154	17,942			148	40,508	23	9,152
70491—Heat transfer equipment, not elsewhere classified.		44,123		60,558		210,716		6,902		1,525		83,886		2,058		173,042		32,658
70601—Auxiliary and accessory equipment, not elsewhere classified, and parts.		44,547		102,924		334,281		44,104		46,512		84,742		8,731		603,933		66,305
70603—Parts, not elsewhere classified, for foreign assembly and manufacture.		113,306		97,172		277,977		47,049		6,851		69,753		38,034		147,214		30,072
70605—Replacement parts, not elsewhere classified.		40,485		18,109		292,225		36,224		113,200		189,463		102,849		703,930		69,886
REFRIGERATION																		
70505—Ice-making machines, not elsewhere classified, and parts.				12,100		428,195		14,805		38,249		14,725		34,135		246,308		9,159
70561—Self-contained commercial refrigerators and freezers, not elsewhere classified.	76	33,115	186	71,443	465	271,093	245	80,296	79	27,702	196	116,081	147	104,964	13,975	4,379,893	5,064	2,538,412
70563—Liquid coolers for water, brine, etc.	39	160,785	29	9,124	43	130,125	10	18,727	4	13,508	10	39,105	8	1,944	453	373,799	49	36,878
70591—Commercial refrigerators and freezers, except self-contained.	5	15,045	9	6,324	118	59,347	53	40,560	8	31,702	25	30,197	20	35,994	1,240	733,365	191	254,715
AIR-CONDITIONING																		
70571—Self-contained air-conditioners, under 2 ton.	3,271	623,960	182	42,568	1,438	286,546	382	84,457	2,276	508,063	1,878	409,148	104	22,505	16,633	3,038,594	329	80,635
70575—Self-contained air-conditioners, 2 ton and over.	392	237,617	30	20,753	302	400,302	71	60,704	81	116,316	181	248,649	3	6,419	1,908	1,144,748	102	123,753
70576—Air-conditioners, except self-contained and air-handling units, not elsewhere classified.	679	76,893	24	47,163	3,137	598,457	56	25,250	21	48,073	1,111	98,199	56	31,747	1,699	241,278	146	32,960
Total.		2,344,346		631,276		4,870,814		834,502		1,145,174		2,257,165		669,356		12,984,387		3,962,365

Source: Report No. FT-410, Part II, U. S. Exports of Domestic and Foreign Merchandise, Bureau of the Census, U. S. Department of Commerce.

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